THE AMERICAN GAS-LIGHT JOURNAL AND CHEMICAL REPERTORY

Publishing Office, No. 42 Pine Street.

Devoted to the Interests of Illumination, Heating, Ventilation and Sanitary Improvement, Domestic Economy, and General Science.

VOLUME XVIII.—No. 11.
Whole No. 335.

NEW YORK, MONDAY, JUNE 2, 1873.

$3 PER ANNUM
IN ADVANCE.

Heating by Gas.

[Extract from a paper read at the Royal Institute of British Architects, on the "Heating of Public Buildings," by John Barber, Esq.]

We live in an age of improvements, and none of us will deny the fact that much happens now as a matter of course which was deemed impossible years ago. Economy, or at any rate convenience, is derived by dealing with essences. It is much more convenient to swallow a teaspoonful of medicine than to drink the bucketful of wash from which it is concentrated. Why should we not apply the same principle in warming our buildings, and use a few thousand feet of gas in preference to burning a ton of coal? and why, taking all things into consideration, should such a course be uneconomical?

During a late professional visit to Denmark, I became intimately acquainted with a Dane who had gone much further than any enlightened Englishman I have yet met with in the treatment and use of gas for other purposes beyond lighting. I visited his house several times before being aware it was heated by gas, and having had my attention drawn to the subject of stoves (heated by gas) by Mr. Seddon, only a short time before, my mind was naturally ripe and ready to take in any ideas which might improve my knowledge on those points. I looked round his room on one occasion for a novelty in the stove line, and not finding one, although the day was very cold and the room warm, I asked how it was heated. My friend took a panel out of his window-bottom, and there I saw a few gas-burners, with perfectly blue flame, playing on a fire-brick lump, with no pipe to take the products of gas combustion away. The heat from combustion and the heat absorbed and imparted by the fire-brick was all allowed to enter the room, and although I was in the room for hours, I did not feel any choky or stuffy sensation. Here was a realization of the very idea which had presented itself to Mr. Seddon and myself, and which I was proposing to bring to a successful issue. Now, I must tell you that the gas there was the best I have ever seen, though no dearer than London gas (6s. per 1000 if used for lighting purposes, or 4s. 3d. per 1000 if used for cooking and heating). I ought also to tell you that my friend cooked entirely by gas, his roasting fire simply consisting of a 16-inch drain-pipe, with a cross-bar at top, inside which the meat was hung, the bottom of the pot resting on a tripod, which also carried a circle of gas-jets; a sort of ventilated dish-cover crowned the whole. The consequence was that carpets and furniture were not spoiled by dust and cinders from fire; chips were saved, as also space for holding them, and labor in not having coals to carry to, and cinders from, the fire; and the first cost of the stoves (if we may call them so) was much less than the elaborate iron ones generally used in the Scandinavian kingdoms.

Now, I feel I may be speaking to sceptics, but I fully believe it is possible so to burn gas, even London gas, that the heat arising from combustion shall be neither unpleasant nor injurious; and if so, I contend that we may most reasonably expect to find economy in its adoption for warming houses in lieu of the use of coal; for this reason, that in coal all the products of combustion itself go up the chimney, whereas in gas, treated as I propose, they would serve to heat the room; and in considering the economy of gas as a heating apparatus for houses, we must credit with the saving in wear and tear of carpets, chips, coal-cellar and chip-house, chimney-breasts and chimney-tops, hearth-rugs, fenders, fire-irons, and register-grates, the marble chimney-piece and its necessary accompaniments, chimney ornaments, mirrors, etc. In fact, it thoroughly remodels a room, and renders much expensive furniture unnecessary; and it is my firm opinion that if due and proper consideration be paid to all these points, the economy will be in favor of the essence of coal—that is, gas—and not coal itself. I am not a chemist or a gas engineer myself, and must leave the actual treatment as to admixture of air to ensure the Bunsen flame and other matters to them to work out; but I think I have just held out to them sufficient promise of success. With the foregoing remarks fresh in your memory, you will most readily conceive how easy and convenient it would be to apply a gas stove under the window-sills of a church or public building, as previously suggested when treating of hot-water apparatus: how easy to regulate the temperature of the building, giving more heat or less, as required, by turning a tap; in fact, the more I think of it, the more advantages turn up in its favor over and above any other system of heating apparatus. What is wanted is a fair and impartial trial, and this may be accomplished without very much trouble or expense. Try one room in a house first and have a meter specially for the gas-stove; carefully register on a thermometer the temperature inside and outside the room for a week; then repeat the operation, use coal in the fire grate, maintain the same temperature inside for the same length of time, weighing the coal, and this will show the actual cost in consumption; the other items of economy, as enumerated above, require no test. After arriving by experiment at the proper form of gas-jets to adopt, in order completely to destroy any pernicious effects arising from the combustion of gas, it becomes an easy matter to arrange the form of stove to which the burning gas-jets are to transmit their heat. I would recommend the following plan: Fix a system of gas-jets within a terra-cotta or earthenware cylinder placed horizontally, the outside of which is ridged to as great an extent as possible (similar to the gills of a gill-stove), to increase the superficial area of the heated surfaces with which the circulating air is in contact. Upon the top of this cylinder or terra-cotta gill-stove lay a vitrified earthenware trough, to be filled with water, and place the whole apparatus in a recess under the window-sill, as previously recommended. By following out these suggestions we obtain—first of all, the great advantage of the form of gill-stove for transmitting heat to circulating air; secondly, we obtain the advantage of softening the heated atmosphere by evaporation of water; thirdly, we have compulsory induction of air by placing the stove in a recess slightly larger than itself; then the advantage of introducing the warm air into the building in a convenient, unconspicuous position, where its effect is more likely to be general. Again, we have no dirt, ashes, coals, or other lumber to provide for or to remove;* and, lastly, we succeed in obtaining a heating power which can be increased or diminished at will, to suit the requirements of the day or the tastes of the public within the building. There is yet the crowning advantage of all to enumerate, which is the securing of the whole products of combustion and radiation, as well as the heat caused by simple circulation. This last advantage, I must confess, is not yet certainly secured; but why should it not be? Nothing need now be put down as impossible to obtain, for every day brings us fresh evidence to prove that what were impossibilities once are now admitted as simple facts.
—*London Jour. of Gas-Lighting.*

Lack of Labor in the Coal Regions.

In conversation, a few days since, with one of our principal Lehigh coal operators, touching upon coal matters generally, we were informed that it was his belief that we have reached a maximum production of coal agreeable to the amount of help at our disposal to mine it. This is a point of vital importance to the trade. There seems to us to be a determination on the part of the coal-mining laborers to seek other employments, notwithstanding the high rate of wages a hard-working man can earn, in consequence of the hazardous nature of his calling, and the numerous privations and hardships oftentimes encountered.

There is, in our opinion, a scarcity of miners and laborers in our coal regions. The high prices paid for mining abroad have kept back emigration, and no considerable acquisition has been made to our force of late years.

Our army of workers has, by strikes and other causes, been driven away to other sections of the country—to our iron mines, where they get as good, and, in some instances, better pay, with less risk of life and limb. Many have "gone West," and sought more congenial occupation in farming and in railroad building: others have returned to England. At all events, be the cause what it may, our force is too small, and cannot, it seems, well be augmented.

* That frequent marrer of architectural effect in churches, the heating apparatus chimney, is removed altogether.

It is for this reason that the men feel so strong in their "Union," and the time may come when they will actually be masters of the situation, in consequence of their scarcity. Mining coal is not such a cheerful calling as that men will not throw it aside for some other occupation less dangerous, if as remunerative. It may be argued that many workingmen have their homes bought and paid for, and hence are permanently located for life, but then such are "the few" in comparison to those who are ready to move, when tempting allurements are offered and circumstances warrant. Therefore, we suggest that it would be wise to study this question of labor well, and in all its bearings, before we act too hastily in considering the control of the trade, and place ourselves in a position that is untenable.

The recent advance in the price of coal in England to 53s. will be the ground for an advance in wages there, which will in turn keep back emigration. If our forces cannot be reinforced, it seems to us, with the natural mortality that is continually taking place, and an occasional Avondale affair, that we will be in a sorry plight in a few years, and that there is really much cause for alarm. As it is now assured that we shall have better prices for coal this year, would it not be well that the miners' wages be increased in a fair ratio, and thus remove one incentive for a considerable acquisition to their numbers?—*Coal and Iron Record.*

Pueblo, Colorado, to be Lighted with Gas.

We learn from the columns of *The People*, that Mr. C. E. Gray, of Lawrence, Kansas, lately visited Pueblo, Colorado, for the purpose of establishing works with which to supply that city with gas, and that his recommendations were so good and his propositions so fair, that the City Council felt justified in entering into an agreement with him, whereby the city shall be lighted by gas. A city ordinance has been published to that effect, whereby Mr. Gray is to have the exclusive right and privilege to build and establish gas works, and to manufacture and sell illuminating gas within the limits of the city for the term of twenty years, and that for the period of ten years no greater municipal tax can be levied or assessed by the city authorities upon such gas works than $50 per annum. In order to protect the interests of the city, Mr. Gray is bound not to charge more than $5 for each 1,000 cubic feet of gas consumed.

Mr. Gray was the builder of the gas works of Lawrence, Kansas, and has made that business a specialty for a number of years past.

The works are to be completed in seventeen months. Pueblo, a city of seven thousand inhabitants, will then be as well lighted as any place in the West.

The New York Mutual Gas-Light Company.—At an election for directors of the New York Mutual Gas-Light Company on Wednesday, 21st inst., the list was filled as follows: Cornelius Vanderbilt, Joseph Seligman, George Opdyke, Daniel Drew, C. K. Garrison, John P. Kennedy, N. B. La Bau, A. V. Stout, George J. Forrest, Joseph Harker, John R. Ford, William R. Garrison, William E. Hoy, Arthur Leary, Robert L. Coffin, Charles Place.

Important Decision in respect to Assignments.—We publish, in another column, the text of a recent decision of the United States Circuit Court, District of California, by Judge Sawyer, in which he holds, substantially, that the purchaser of a patented article, obtained from a *bona fide* owner of a territorial patent right, may use and sell such article outside of the territory owned by the seller. Thus, in the case of the Egg-case patent, the Judge held that the purchaser, who bought the patented goods of parties owning the patent for Illinois, had the right to send the goods to California, use and sell them there, notwithstanding the protest of the party who held the patent for California. If this doctrine is sound, then the selling of patent rights in specified territorial divisions is a farce, and new restrictions become necessary in the assignment, as Judge Sawyer suggests.—*Scientific American.*

Chemical Repertory.

No. 93.—June 2, 1873.

EDITOR—HENRY WURTZ.

CHEMICAL EXCERPTS.

741. Analysis of Anthracite from Dietmansdorf, in Styria.—P. Von Mertens.—This contained:

Carbon	78·25
Hydrogen	0·39
Ash	21·36
	100·00

—*Amer. Chemist.*

742. The Exports of Petroleum in 1872 amounted to 150,385,869 gallons, against an export of 155,613,064 gallons for 1871. The qualities of oil shipped were in this proportion:

Refined	128,906,361
Crude	14,807,325
Naphtha	7,660,173

743. The Water of the Berlin Water Supply, in Dyeing.—M. Reimann.—The water of the Spree does not itself contain many impurities which render it unsuitable for dyeing purposes, but in passing through the iron mains it takes up some iron, and this water, used without any purification by several of the smaller dyeing establishments, has the effect of giving "saddened" colors.

744. The London Gas Stokers Strike.—The five stokers who, in December last, were convicted of conspiracy at the Beckton Gas Works, were released from gaol on Tuesday, the 15th April. They were originally sentenced to twelve months imprisonment, but the Home Secretary commuted their punishment to four months. The occasion of their release was taken advantage of for the purpose of "a demonstration," at which these interesting martyrs hob-nobbed with several eminent politicians of the Odger and Potter school.

716. A Planetary Balloon.—By means of the spectroscope, astronomers have found that the atmosphere of Uranus is almost entirely composed of hydrogen gas.

747. Phenol and Carbolic Acid.—M. Boboeuf.—While phenol, either concentrated or in aqueous or alcoholic solution, is a most dangerous poison, the alkaline salts formed by this acid are perfectly innocuous, although preserving the properties of the acid. —*Les Mondes.*

748. Gas-Lighting at Glasgow.—At the meeting of the Police Board, on the 7th April, the Watching and Lighting Committee reported that, having considered the reports of Dr. Wallace and the inspector of lighting on the new method of lighting gas-lamps by electricity, the committee had agreed to recommend that the inspector of lighting should be instructed to proceed with the alterations of the existing street lamps necessary to make them suitable for pole-lighting. Mr. Osborne in moving the adoption of the minutes, said the committee had given up the notion of lighting the street lamps by electricity. They thought it would not be practicable, anp they proposed that another method upon which they had almost resolved previously, should now be adopted. The new system was that of lighting the lamps by means of small poles (gas-torches we presume—Ed. Am. G.L.J.) and the result would be that the use of ladders would be dispensed with.—*London Jour. Gas-Lighting.*

749. The Town Council of Windsor, acting as the local sanitary authorities, have been summoned by the Thames Conservators for polluting the river by the discharge into it of sewage. Windsor is very well drained, but, unfortunately, the very perfection of its drainage system aggravates the evil complained of. On the upper side of the town the river entered the sewers and flushed out every impurity, their being a fall of no less than seven feet to the outfall. This rendered the outfall at Windsor the most offensive and disgusting in the whole river, and the proceedings were stated to be the merest justice to the water companies who drew their supply from the Thames, each of which were paying the Conservators £1,000 a year, to enable them to increase the purity of the water. After a lengthy discussion, it was resolved to adjourn the case until the first Monday in June, when it is to be hoped that the local board will have come to some definite arrangements.—*Iron.*

750. The Earthquake shock of the 12th of March alarmed the Neapolitans very much, and ever since then Vesuvous has been smoking at a furious rate Palmieri, the able director of the Vesuvius Observatory, has published a letter in the daily papers, in which he says that we have undoubtedly entered upon a new period of eruption. The seismograph, an instrument by which the internal convulsions of the volcano are recorded and measured, has been very unquiet of late. If an eruption does occur soon Palmieri thinks it will be central—that it, it will come from the principal crater.

751. Rendering Refuse Tar of Value.—The crude oils resulting from the distillation of schist, boghead, and petroleum, are treated with sulphuric acid, which separates a tarry mass which has hitherto been a waste product. F. Blandin, of Metz, has sold to the Italian government a process for working up this "sludge," as it is called, to advantage, It consists in treating the sludge with a concentrated solution of common salt, when the sulphuric acid separates as sodic sulphate. Ammonic chloride may also be employed, by which means ammonic sulphate may be obtained. On washing the tar with much water, and a little alkali to neutralize what acid there may remain, a very good tar is obtained, lighter than ordinary tar, and suitable for various purposes.—*Amer. Chemist.*

752. Russian Mineral Fuels.—An important advantage which Russia posesses, to which, however, the inhabitants are not yet sufficiently alive, is the existence in abundance of the fuel—of which our supplies have been recently curtailed—coal. As yet, however, notwithstanding the fine field for the development of the production of this mineral in Russia, scarcely any steps have been taken in the direction of doing so. There is a magnificent deposit of extraordinarily fine black gas coal near the river Kama. It is thick near the surface, easily worked, and easily transported to the river-side—owing to the apathy of the owners of the estate this yield is now lying *perdu*. Brown coal exists in the central districts, large quantities of anthracite in the south, and immense deposits in the basin of the Donetz—all of which only await the enterprise that shall dig it from its bed and utilise it in the manufacture of its companion world civiliser—iron.—*Iron.*

753. Petroleum in California.—Rumors have been current for some time past, of discoveries of petroleum on the Pacific slope. Their truth is at length confirmed by the *Los Angeles Express*, which gives the following particulars of the region in which the petroleum has been found: It says: "The oil range is situated 35 miles northwest from the city of Los Angeles on the road to Fort Tejon, and 13 miles from the Mission of San Fernando. Three tunnels have been cut from 70 to 100 feet in depth, and from these and the two wells the flow of oil is continuous. The petroleum is led through iron pipes to large tanks, and is dipped with buckets from springs. The cost of transportation to Los Angeles is about two cents per gallon. We have seen the report of Louis Falke, now State Assayer, who estimates the value of the crude petroleum submitted to him for analysis, to be much greater than that of Pennsylvania or elsewhere in the United States."—*Sci. Press.*

754. "Lunar Radiation of Heat."—The Earl of Rosse delivered a lecture on "Lunar Radiation of Heat" at the Royal Institution, on the 29th ult., and his paper comprised the experiences of several years on a question in which others besides scientific men take an interest. The radiation of heat from the moon was observed by means of reflectors having thermopiles in their foci, and Lord Rosse is of opinion that the difference between the radiation of the new and the full moon may be set down at about 200 degrees. The question as to a constant heat emanating from the interior of the moon he is inclined to answer in the negative. His experiments in this direction find no trace of heat perceptible from that source. The intensity curves of the light seem not much out of correspondence with those of heat, and more careful investigations may bring them still closer. It was remarked by subsequent speakers that the lecturer had carefully examined the literature, both British and foreign, on the subject in hand, and that this added much to the value of his own observations and suggestions.—*Iron.*

755. An Air Well.—A correspondent, G. W. G., asks the opinion of the scientific world on the following: A tube well was driven to the depth of 93 feet for water, but instead of obtaining the object, a strong current of air came rushing out of the tube with such force that the noise could be heard at a distance of several rods. Fire at the bottom of the tube burned brightly, and the air came out with a steady flow. This continued for about five days, when the current changed, and air flowed into the tube at about the same velocity. The location is on a divide—the highest point of land between Toledo and Chicago; the country is generally level, but somewhat rolling. Prof. Foster, of Chicago, has been written to for his opinion; he thought the current of air might have connection with a subterranean cave, and thence rose to the surface; but the reversal of the current, without any change of temperature above, exploded that theory. If it was in the vicinity of coal, instead of pure air, gas would naturally escape. The soil is sand and gravel, with blue clay beneath. The tube was withdrawn and sunk in another place to the depth of 70 feet, when rock was struck, but no water was found. —*Scientific American.*

756. Mica Head-Lights for Locomotives.—The introduction of silvered mica reflectors into locomotive head-lights has proved a complete success. An engineer on the West Jersey railroad, who has been using them, says he can by their aid distinguish the features of a person at a distance of *four hundred yards.* They are now being tested on the Reading, North Pennsylvania, and other railways, with the most encouraging prospects as to their adoption on account of their economy, durability, efficiency and saving of labor. In case of accident they are but little liable to injury. A case is mentioned of a locomotive on the North Pennsylvania railroad, which recently exploded, and the smoke stack of the locomotive fell heavily on the lantern, completely demolishing it and bending the reflector almost double; when relieved of the pressure, it sprung back to its shape, and with the exception of the displacement of one or two small pieces of the silvered mica, it was uninjured; whereas had it been a metal reflector it would have required replating and bending, involving an expense of at least twenty dollars.

[Why might not these reflectors be advantageously introduced in our hydraulic mines?—*Mining and Scientific Press.*

757. South Yorkshire Coal Fields.—In the South Yorkshire coal field, which is second only in extent to that of South Durham, there are a number of seams of coal, locally known by the following names: The Black Shale, Silkstone, or Sheffield coal; Potters, Deephard, Parkgate, or Manor coal; the Barnsley, Nine-feet or Top Hard Bed; the Maplewell, Kent's Five-foot, or High Hazles coal. The lower limit of the coal measures is clearly defined by the Silk-stone steam—a bed averaging about five feet six inches in thickness, but in parts composed of two seams separated by a few inches of dirt. The Sheffield collieries also work this seam very extensively, and that town itself stands directly upon it, about 200 acres having been left unworked for the support of the town. So close to the surface does the coal (not the Silkstone bed, as a matter of course) in some places lie, that there are popular legends as to people working a seam in their cellars (!); and, but a year or so since, the foundations of a large manufactory in the centre of the town (Eyre street) were discovered to be on fire; the only remedy for the accident was by digging out the coal as far as was necessary. At the same time it must be said that there is no fear of the recurrence of such a fire on a large scale. South of Sheffield the Silkstone bed underlies, by about ten yards, a deposit of black shale ironstone.—*Iron.*

758. Chemical Action of the Solar Rays.—M. Marchand, says *Les Mondes*, has just completed a long and careful study of the chemical action of solar rays. He exposed to the light a mixture of definite proportions of oxalic acid, perchloride of iron and water. Under the influence of the rays, the perchloride was decomposed and became protochloride; the chlorine, set at liberty, combined with the hydrogen of the water to form hydrochloric acid; and the oxygen of the water, uniting with the oxalic acid, transformed it into carbonic acid, which was disengaged. The quantity of carbonic acid thus given off is proportional to the intensity of the light, and serves as its measure. The difficulty was, however, to determine accurately the amount of carbonic acid without having recourse to mercurial apparatus, very expensive and hard to manage. M. Marchand has found, however, and *Les Mondes* terms it a great discovery in practical chemistry, that, for the determination of the carbonic acid glycerine may be well substituted for mercury. He has also observed that his mixture, considered as a reagent of chemical rays, differs from the nitrate of silver in the particular that the maximum of its intensity is at the middle of the blue, while that of the nitrate is at or near the violet.—*Scientific American.*

[Glycerine has long been used by the Editor of this Journal, in a multitude of ways, for confining gas; its molasses-like consistence being the main objection. An india-rubber bag or tube may be rendered practically impervious to gas by rubbing with glycerine, a device now in use for 10 years at least by the undersigned. Dr. John W. Draper, probably 20 years since, published the use of solutions of iron with oxelic acid for the same purpose as above.—H. W.]

A New Gasholder for the Louisville Gas Works.

Yesterday afternoon (May 9th) we witnessed the inauguration of the new gas meter at the works of the Louisville Gas Company, and as this was the first of the size ever erected by western mechanics, a short description may not be out of place.

The tank in which the holder rests is 114 feet in diameter, and required for its construction over 1,000,000 brick. It is 25 feet in depth, and the base of the wall is eight feet in thickness, from which it gradually tapers to 30 inches at the top, where it is capped by a tier of cut stone.

The holder is telescopic, and made to contain 500,000 cubic feet of gas, and is divided into two sections, the upper section being 110 feet in diameter and 24 feet in height, while the lower section is 111½ feet in diameter and 24 feet in height. The entire holder, exclusive of the guiding columns, weighs 110 tuns. Surrounding the holder are 10 iron columns, each 50 feet 8 inches in height, composed of six sections. These columns are 41 inches in diameter at the base, and 31 at the top, and weigh about 8,000 pounds each. A species of iron lattice work surmounts the top of the pillars, rendering them still more safe and substantial.

At each column are brackets running the entire length. At the bottom of the lower section, between the holders and the brick work of the tank are a set of rollers. These rollers work against cast-iron plates, secured in the walls, and are to prevent the section from shifting from one side to the other, as it rises or descends. On the top of the lower section are placed ten double brackets with rollers and chairs for a similar purpose. On the top of the upper section are ten large brackets and rollers, over which the chairs attached to the lower sections pass, and from thence down inside the columns, which are hollow, when there is a weight of 2,300 pounds attached to each chair, as a counterbalance. On the top of the lower and the bottom of the upper section are placed two hydraulic cups or cruls, for the purpose of preventing the escape of gas when the holder is inflated to its full capacity, which effectually performs this duty in the same manner as does the water in the tank at the base of the holder. The holder, which is the first ever erected by western or southern mechanics, was constructed by Messrs. Dennis Long & Co., who employed Mr. John Keller as superintendent, under whose immediate supervision the entire work was carried on. William Weir, of this city, furnished and put up all the sheet iron work, and in fact, everything used was manufactured in this city by our own mechanics.

Having finished the inspection of the works, the invited guests, among whom were his Honor the Mayor, a large number of the city council, representatives of the press, etc., repaired to the "tile-house," where an elegant collation had been spread by the officers of the company, of which all were cordially invited to partake. After paying our attention to the edibles, Dr. J. Lawrence Smith, president of the company, arose, and in proposing the first regular toast, gave a history of telescopic gas-holders. The company having found the capacity of the old holders insufficient to supply the wants of their patrons, determined to provide more enlarged means of storage, and after examining the works in other cities, decided upon erecting a holder of sufficient capacity to meet the wants of the city and citizens for a long period of years. Believing that the telescopic holder was a great improvement over the old style, they determined to erect theirs on this principle. But here a difficulty arose. The gas-holder of this kind had never been erected except by Eastern mechanics, and the company desired to patronize home industry, but after having made specifications and estimates for the work Mr. Dennis Long came forward and proposed to undertake its erection. Being satisfied that his proposition was not extravagant, they sought no further—made no attempt to secure foreign bids at a less rate—but gave him the contract, and the work which had just been examined was the result, which the company now finally accepted. After paying a high compliment to the ingenuity, energy and industry of our mechanics, he proposed the health of "Dennis Long, the Phœnix of Louisville."

In behalf of Messrs. Long & Co., Mr. Miller responded to the toast in a very neat and appropriate little speech, enumerating the many difficulties which they were compelled to contend with, and paying a high tribute to the liberality of Dr. Smith and the Directors of the company, and concluding by hoping that others of our citizens would follow the example thus set, and do all in their power to foster and encourage home industry.

Charles Long, Esq., President of the Council, being called on made one of his characteristic speeches, alluding in complimentary terms to the liberal spirit displayed by the gas company, and paying a high tribute to the ability, learning and fine social qualities of Dr. Smith.

Mayor Jacob being called on, declined to speak. Mr. Long had made the speech he would have made, and had done so much better than he could have hoped to do it, and just now the good things on the table was occupying his attention.

Mr. Tom Rankin, the genial superintendent, then offered the following toast: "Our new gasholder—may it wear Long."

After a short time spent in examining the machinery of the generating department the company retired, all expressing themselves highly satisfied with their visit.—*Louisville Evening Ledger, May* 10.

Chemical and Sanitary Report upon the Passaic River.

By Prof. Henry Wurtz.

To the President and Commissioners of the Board of Public Works, of Jersey City.

[Continued from page 167.]

THE ANALYSES.

I. Calculation of the Analyses.

Tables I. and II. give what may be called the immediate results of the analyses. The mode of calculation, and its results given in Table III., are of more interest to chemists, than in a sanitary view; as few chemists agree in every respect about the exact method of arranging the various constituents as they exist in combination in the water; and no chemist will deny that our knowledge is as yet too imperfect to be a safe guide in this path.

Every water-analyst who examines Table III., will readily perceive what may be peculiar in the views of the present writer in this respect, and no more space need therefore be taken up.

It will be well to say that all these figures are calculated on the basis of one United States gallon equalling 231 cubic inches of distilled water, each cubic inch weighing at 60° Fahr. 252.5 grains, making that gallon 58,327.5 grains. Some estimate it at a slightly different figure, but the difference is so trifling as to be immaterial.

THE SEDIMENTS.

Before the settled water was pipetted off from the sediment, in each case, a mark was made on the bottle at the surface of the liquid. The sediments were carefully detached from the glass in every part by bent rubber-tipped glass rods, washed with some of the same water into small beakers, from which, after settling again clear, they were transferred to weighed watch-crystals, dried at about 100° Fah., and weighed. The volume and weight of the water were then found by filling up to the mark from a calibrated measuring-cylinder.

ANALYSES OF THE WATERS.

Table I.

Totaal Solid Residues, per one United States Gallon of 58,327½ grains, of the Evaporation and Incineration of Samples of the Passaic water.

(N. B. The quantities stated apply only to the residues in the 3d column, from the Low Tide Water. In the cases of the High Tide and Reservoir Waters, but about half these quantities could be taken, as the amount of water at disposal was but half as much. Of the Hydrant Water, the two residues given in the 6th column, were from enormously larger quantities, 4 and 5 gallons respectively.)

	Quantities tak'n in grains.	Settled Waters, taken October 10, 1872, at Belleville. Extreme Low Tide.	Extreme High Tide.	Receiving Reservoir.	Unsettled water, from Hydrant in Hoboken Average of Dec. 1872 and Jan. 1873
Residues of Evaporation	(1.) 12,703	5.242	4.824	4.533	4.088
	(2.) 14,473	5.159	4.614	4.848	4.125
	(3.) 14,337	5.090	4.856	4.921	
	(4.) 30,6595	5.149	4.837		
	(5.) 30,674	5.312			
	Mean of All.	5.190	4.783	4.767	4.107
Ashes or Residues of Incineration.	(1.) 12,703	3.233	2.832	3.144	2.909
	(2.) 14,473	3.293	2.926	3.387	
	(3.) 14,337	3.320	2.846	3.444	
	(4.) 30,6595	3.448	2.942		
	(5.) 30,674	3.475			
	Mean of All.	3.354	2.887	3.325	2.909

It willl be observed that the amounts of volatile and combustible matter are not given, as is usual (these being usually classed as "organic matter"). In the case of this water, these are in large measure made up of nitric acid, carbonic acid expelled by the silica, and oxygen from the conversion of the sulphates into sulphides.

Table II.

Immediate Results of Analyses of Samples of the Passaic water, expressed in grains and fractions thereof, per U. S. gallon of 58,327·5 grains.

Constituents of the residues from Evaporation.	Settled Waters, taken October 10, 1872, at Belleville. Extreme Low Tide.	Extreme High Tide.	Receiving Reservoir.	Analysis of 5 gals. of unsettled water, taken day by day, from hydrant in Hoboken. Winter average, December and Jan'y.
Sulphuric Acid	.6462	.7760	.6500	.2012
Nitric Acid	.1925	.3383	.2409	.2800
Carbonic Acid	.4100	.2000	.2500	.2880
Chlorine	.1505	.2923	.2163	.1520
Phosphoric Acid	.3800	.1780	.2001	.1202
Silica	.7910	.1120	.4000	.6344
Lime	1.0400	1.1974	1.1120	.8037
Magnesia	.3580	.4930	.4100	.3950
Potash	.0987	.2500	.2375	.1375
Soda	.1857	.4200	.3840	.2730
Ammonia	.0100	.0038	.0088	.0050
Peroxide of Iron	.1170	.0562	.0830	.0690
Alumina	.1660	.0956	.1322	.0868
Humic, Peaty Acids (by difference)	.6007	.2638	.3612	.6136
Proteine Derivative or "Albumenoids"	.0437	.1066	.0810	.0467
	5.1900	4.7830	4.7670	4.1070

Table III.

Estimates of the Dissolved Saline Contents of Passaic Waters; founded on Analyses; expressed in grs. and fractions thereof, per U. S. gallon of 58,327·5 grains.

Theoretical Constituents of the Residue from Evaporation.	Samples taken at Belleville, Oct. 10, 1872. Thoroughly settled before Analysis. Extreme L. Tide.	Extreme H. Tide.	Receiving Reservoir.	Sample of 5 gals. from Hoboken hyd'rt taken gradually during 20 days in Dec. '72 & Jan. '72 ev'p'td in platinum	
Sulphate of Lime	1.0985	1.3192	1.1050	.3420	
Nitrate of Lime	.2923	.5137	.3288	.4252	
Phosphate of Lime—tribasic	.8300	.3847	.4368	.2624	
Carbonate of Lime	.0677	.4545	.5681	.6545	
Carbonate of Magnesia	.7258				
Chloride of Sodium	.2480	.4817	.3564	.2505	
Soda	.1190	.1652	.1993	.1402	These bases probably exist in the water in connection with the peaty acids, though perhaps also in part with car. acid, which is expelled and replaced duri'g the evaporation, by the peaty acids and the silica.
Potash	.1190	.2500	.2375	.1375	
Magnesia	.0124	.4930	.4100	.3950	
Lime		.0158	.0143	.0090	
Silica	.7190	.1120	.4000	.6344	
Hydrated Peroxide of Iron	.1375	.0657	.0970	.0817	
Hydrate of Alumina	.2530	.1457	.2015	.1323	
Humic or Peaty acids, by difference	6007	.2638	.3612	.6136	
Ammonia, free & comb'n'd, or as urea?	.0100	.0038	.0088	.0050	
Proteine-Derivat ves, or "Albumenoid" matters	.0437	.1066	.0810	.0467	
Total grains per U. S. gallon	5.2766	4.7906	4.8067	4.1300	

Table IV.

SEDIMENTARY DEPOSITS.

WATERS.	Extreme Low Tide Oct. 10, 1872.	Extreme High Tide Oct. 10, 1872.	Receiving Reservoir, Oct. 10, 1872.	Hoboken Hydrant, Nov. 1, 1872.
Amounts operated on, in grains	61,729	62,470	60,180	58,297
Grains found, per U. S. gallon	1.008	0.504	0.479	0.435
Prof. Horsford, October, 1851		1.262		
Prof. Chandler, Hoboken Hydrant water of May 3, 1872				0.520
Total solid contents of unsettled waters; that is, the sum of these sediments and residues of evaporation	6.198	5.287	5.246	

In the low tide water and receiving reservoir, appeared quantities of a green confervoid growth, characteristic of standing waters, much more perceptible on the watch crystal during desiccation than at any time before. There was more of it in the low tide water. In the high tide sediment there was not the slightest trace of this perceptible to the eye.

The general results of these were confirmatory of the above. The low-tide sediment was apparently made up chiefly of beautiful spicular and fibrous organisms, with bunches of their spores, doubtless belonging to the *confervae* (fresh water *algae*, frog-spittle). These were mingled with *very minute* translucent grains, looking like rounded sand, but more probably clay. In the reservoir sediment, there was more of the sandy looking matter and less of the organisms. Curious to say, however, though the search was made patiently for a long time, no trace of fibre or spore or anything organized whatever, appeared in the high-tide sediment. It was all a fine sandy looking mud. As all these waters had been kept under precisely identical conditions, and as the germs of this vegetation must have been equally dispersed through all of them, this is regarded as a most surprising fact. That the Newark sewage, or some other influence removes, between low and high tide, from the water, something essential to the germination and growth of vegetation, or else imparts something inimical thereto, are the only inferences to be drawn. Some of the green mass of confervoid fibre, removed from the edge of the watch crystal, of the low-tide sediment, and burned to ash on platinum foil, left a voluminous mass of white spiculæ, which transferred to a platinum loop, fused readily to a transparent glass, and behaved generally like a mass of phosphates, but the quantity was too small for analysis. The hydrant water sediment was also totally destitute of organisms and similar in aspect to that from high-tide.* An attempt was made to determine, by incinerating, the amount of vegetable matter in the two sediments containing it, assuming that the mineral portion of each retained, when dried in air, about the same amount of water. The following are the results:

	Water per 100 of Sediment. Estimated for 3 and 4.	Anhydrous Mineral matter per U. S. gal. of water.	Vegetable gr'wth in one U. S. gallon, in dry form
1. High Tide	20.00	0.402 grain.	*None.*
2. Hydrant..	23.38	0.368 "	(not determined)
3. Low Tide.	8.32	0.349 "	0.561 grain
4. Reservoir.	15.01	0.295 "	0.152 "

The results in the last column of this little table must be regarded as among the most interesting obtained in the course of this investigation. The ash in each case contained iron, and had apparently about the same tinge of red.

OBSERVATIONS ON THE COLOR OF THE WATER.

It was thought probable that a few observations under this head might not be without interest, the more especially as the writer has heard the color of the water referred to as an indication of unwholesomeness, or at least as very suspicious. Nothing whatever appearing, however, in the analyses, to which color could be attributed, except matter of a peaty character, which has not usually in this country (unless occurring in excessive quantity) been regarded as noxious, it was thought desirable to compare some of the Belleville samples with a sample collected above the Falls at Paterson. The following indicates the order and intensity of shade of the different samples submitted to observation:

1. Distilled water..... 0
2. Receiving reservoir (after settling 3 mos)..... 2
3. Hoboken hydrant " " " 2
4. High tide at Belleville " " " 2
5. Low tide at Belleville " " " 5
6. Above Falls at Paterson Jan. 28, (very limpid).... 8
7. Hoboken hydrant, fresh (turbid).....12

* This, however, was not a parallel experiment, being made later in the fall, during a very cold November. The absence of germination in this sample, therefore, has no significance, either positive or negative.

These observations were verified by calling in the aid of a lady, of artistic attainments and educated eye for delicate shades of color, whose judgment did not differ substantially from that of the writer. One or two curious conclusions follow here. *First:* if the coloring vegetable or peaty matter *is* noxious, the water above the Falls is twice as bad as that below Paterson in this respect, and four times as bad as that from our hydrants.* *Second:* The peaty matter is gradually eliminated from the water, in the lapse of time, either by the action of oxygen, or through being precipitated by something in the sewage. The former seems likely to be the true cause of its gradual disappearance.

Before leaving this subject it will not be improper to direct attention to the confirmation afforded by these color comparisons, of the figures given for the peaty matters in the high tide and low tide waters respectively, in the tables of analyses.

CHEMICAL AND SANITARY DISCUSSION OF THE ANALYSES.

These analyses furnish many points of interest in a purely chemical view, but it would be inappropriate to give much space to any of these, which have no *direct* sanitary bearing. Among the most important are the changes incurred by the water while being swept backward and forward past Newark by the tides. These are (see Table II.):—

A small increase of sulphuric acid, lime and magnesia.

A large increase of the nitric acid, chlorine, soda and proteine derivatives.

A diminution of the carbonic acid, phosphoric acid, iron, alumina and humus compounds.

A large diminution of the silica.

The increase of nitric acid accounts for a large part —say half—the loss of carbonic acid. The phosphoric acid may very well be believed to have gone down with the alumina and iron, taking with it humus and some ammonia, and if, as seems probable, the silica is really held in solution by the humus acids, this would precipitate also. The loss of these ingredients *possibly* accounts for the fact that no confervoid growth whatever appeared in the bottle of high-tide water, as stated under the head of sediments.

Among these chemical points, of sanitary bearing, doubtless the most striking and important of all is the *increase* in the quantity of nitric acid in the water brought up by the rising tide past Newark, which increase is .1458 grain per gallon. If this is regarded as having proceeded from albuminous or proteine bodies, it represents .923 grain of these, which, added to the increase in the quantity of such bodies found directly, makes .986, for simplicity say one grain per gallon, of dry products of putrefaction of albuminous matters, or say equivalent to 4 grains of decomposing egg-albumen per gallon.

If we suppose one *rotten egg*, weighing about 800 grains,† to be beaten up with 200 gallons of low-tide water at Belleville, it might represent the *initial* effect of the Newark sewage, according to this rather unsavory calculation. Part of the increase of nitrogen may, it is true, have come from urea, but as this represents urine, the idea is not less repulsive, at first glance. Suppose it to be all albuminous, however, originally (in fact the nitrogen of the urea is much more likely to pass off as ammonia than to remain as nitric acid), what a rapid change is here shown to have occurred during the short run that the water has had, only between three and four miles, from Newark up to Belleville.‡ The sewage matters have been constantly suffering a process of decay, slow combustion, or *eremacausis* (as it was called by Liebig), through the agency of the free oxygen held in solution in the highly aerated water pouring in every day from up stream; and, as the analyses further show, the residuum of the albumen or proteine derivatives, left from the Newark sewage, over and above those brought down from up stream, is but .0629 grain per gallon, and the whole amount in the high-tide but about one-tenth of a grain, equivalent, *if putrid*, to one rotten egg in 2,000 gallons of water. But it is unreasonable to suppose that this substance, whatever it may be, which yields ammonia with the powerful reagent of Wanklyn & Chapman, is still in a state of *putrefactive* change, or even *capable of such change*. Proteine bodies yield many products of metamorphosis which are highly stable. Dr. R. Angus Smith, in his writings on these subjects, refers repeatedly to waters answering to the Wanklyn–Chapman test, which are nevertheless incapable of putrefaction, and in one place infers the existence of some proteine body not susceptible of this change.*

Let us pause here for a moment to express our "special wonder" at this noble provision of nature, or rather of Nature's God, by virtue of which the foul refuse spewed out by a city of more than one hundred thousand inhabitants, in one hour's time,† (which is probably somewhere about the time of flow from Newark to Belleville) is so completely modified that we find scarce anything left as an indication of it except harmless saltpetre. The agency in brief which effects this is that universal one which has long been studied by chemists, known as *nitrification*. Animal matters containing *nitrogen*, with *water*, *oxygen*, *alkaline* substances, and always *time*, are the conditions requisite to its progress. These analyses show the Passaic water to be an alkaline water, and we have present all the conditions for nitrification. The surprising circumstance is the short time apparently required.

Before leaving this branch of the subject, it may be well to put it in a little stronger light, for the benefit of some readers who might be disposed to regard half a grain of nitrates in a gallon of water as insignificant, and the conclusions here founded upon these premises as "making a mountain of a molehill." The .3383 gr. of nitric acid in the high-tide water represents, when calculated as saltpetre, .6327 grain thereof, and this, when calculated on the average daily flow of the Passaic water, is 90,400 lbs. of saltpetre per day (about 16,500 tons per year). About 40,000 lbs. per day of this is furnished by Newark, the other 50,000 by the rest of the inhabitants, both man and beast, oppidan and rural, of the 900 square miles of Passaic watershed above. Your reporter ventures to say that had he a complete series of determinations of nitric acid in the high tide and low tide waters at Belleville throughout some extended period of time, a correct calculation could be based on it of the whole population of the basin, as compared with Newark. When we remember that this nitric acid represents but a fraction of the nitrogen of the effete matter from which it came, and that this nitrogen was itself but a small percentage of the whole, it is clear that these thousands of pounds of saltpetre may represent hundreds of thousands of pounds of this effete matter cast daily into the waters of the Passaic. Some eminent chemists, particularly in England, have thrown doubts upon the conclusions drawn by others from nitrates, as indicating previous sewage contamination; claiming that nitrates may be washed out of older geological formations, and so on. In our present investigation we may cast aside this objection, as the Passaic basin contains nothing of the sort that could yield nitrates. All these must have come from the excreta of men and animals, the washings of barnyards, manured soils, etc. [It may be added here that determinations were made of nitric acid in the water above the Falls, but as this is outside of the subject of this report, it will be omitted at present.]

We have now considered the bright side of the picture; let us look on the reverse. These samples of water were collected in cool autumn weather. Would analyses of the water in the heat of the summer show the same or like results, when the water is warm? Some will reply to the writer "that your slow combustion or *eremacausis* ought to be promoted by warmth, and do we not all know how much more prevalent nitrification is in hot climates, like India, for example, where all the waters are full of nitre?" The reply to this must be emphatic. The *warmer* the water, *the less oxygen it can absorb* under given circumstances. It is the oxygen dissolved *in the water*, that does the work, and not that of the circumambient air, which can act but superficially; and, in such countries as India, it is the dense population, the teeming animal life, and the consequent superabundance of putrid animal matter, from man, beast, bird and insect, that causes the abundance of nitrates.

In 1857, the great chemist, Bunsen,‡ published determinations of the capability of water to absorb oxygen at different temperatures. The following figures are extracted from his tables. One hundred volumes of water, *when saturated* with oxygen, contain at the temperatures specified respectively (reduced to Fahrenheit degrees, the intervals being 5° C. or 9° F. apart):

* Without any malignant desire to imitate anything in the way of a sanitary panic in a sister city, I feel it incumbent on me to refer to the fact that peaty waters have been found, in Scotland and elsewhere, to produce diarhœas, etc., at least at certain seasons. H. W.

† I found ten fresh eggs to weigh 8,750 grains. Rotten eggs I found were not purchasable articles, at least *under that name*. I allow something for the loss of weight in putrefaction. As the white of egg contains 15 per cent. of dry albumen, and the yelk about 40 per cent., and the former is more bulky than the latter, I have called the solid matter in the whole 25 per cent H. W.

‡ On further consideration, since writing the above, it appears probable, however, that much of the water brought up by the high tides has run past Newark, back and forth, several times, and has had therefore a far longer course of flow than this. Still the *average* result should be the same, as it now appears to me. H. W.

* *Chemical News*, June 11, 1869, p. 281.

† See note on previous page.

‡ Gasometry, Roscoe's edition, pp. 153 and 256.

At	32° (freezing 4.12	41° 3.63	50° 3.25	59° 2.99	68° 2.84	volumes.

As the temperature of the water during the summer heats ranges ten or fifteen degrees higher than the last figure (which is as high as Bunsen gave) we may assume as approximate that the power of the same water to absorb oxygen, *ceteris paribus*, is twice as great in the winter cold, as in summer heat. The qualification is used, because barometric pressure, and composition of the water itself, particularly the latter circumstance, have large, and even overwhelming influence, as has been ascertained by experiments with the new methods before referred to.

Those who propound the idea that warmth should promote and hasten complete decay, and resolution of organic matter into its primary constituents; probably confuse *putrefaction* with eremacausis. Putrefaction, once begun, goes on without oxygen, and it is this latter process which engenders abnormal, offensive and poisonous products, which it is the office of oxygen, the scavenger of the air and waters, to attack and destroy, by converting them into carbonic acid, water and nitric acid. Such offensive products are usually extremely sensitive to the attacks of oxygen; or extremely *unstable*, as chemists phrase it, in the presence of this potent spirit. The great chemist, Pasteur, is even admitted to have proved, within a few years, that among the great variety of living and moving animals which are engendered from their invisible germs in the midst of fermenting and putrefying matters, there is a class which is instantly *killed* by contact with oxygen; and though, like all other animals, they must have this element, they get it by decomposing other products of putrefaction, congenital with themselves. Whether we are to find among this strange class of existences, the promoters and conveyers of the plagues that afflict mankind—the evil beings that escaped from the box of Prometheus when opened by the curious Pandora, as the ancient myth has it—is foreign to our inquiry. Our present object is fulfilled when we know, what these analyses appear so clearly to point out—that we owe our safety hitherto, to the rapidity with which *nitrification* goes on in the Passaic waters.

In addition to the momentous fact above developed, that our water can absorb, at the utmost, but half as much oxygen per gallon in summer as in winter, another fact, also important it may be, must be remembered. The volume of aerated water that flows down from above tide water in the former season, is *far less* than at other seasons. There are no means of determining exactly the difference at present at hand, except by comparison with other rivers in nearly the same latitude. The difference, for instance, between the maximum flow of the Hudson at Albany in March, and its minimum in July, is as *seven to one*. If this rule holds as to the Passaic, the amount of oxygen brought down by the stream, to attack and destroy the fæcal and urinary compounds cast into the river at Newark, is in July but one-fourteenth as great as during the flooded seasons. This, however, is doubtless too strong a view, as the alternate sweep of the stream up and down at each tidal change, even to some extent as far up as the Dundee dam, some seven miles above Belleville,* must assist largely in the aerating operation, and this operation is therefore by no means wholly dependent on the downflow of the river itself. Still, when we consider that in midsummer the heat intensifies putrefaction, and that the amount of available oxygen to destroy its products is largely diminished by the enfeebled solubility of oxygen in the water, it would appear that we have a reasonable solution of the unpleasant odor and taste that the water has of late years sometimes acquired in July.†

Moreover, looking to the future, though there seems every reason, on considering these analyses, to believe that no detriment to the public health has *up to this time* arisen from the use of these waters, there seems no good reason to deduce the slightest confidence or belief in an indefinite, or even a long continuation of this immunity. Newark grows rapidly, and grows towards Belleville; and the distance from your pumps within which it is safe to have a common sewer emptying into your river, has not yet been determined.

[To be concluded.]

The brooklyn Gas Strike.—The gas strikers oave resumed work at the Brooklyn Gas Works. Yesterday (May 27) all the old hands were taken on, and the new ones discharged. Thus the strike virtually ends in the defeat of the employees.—*Brooklyn Daily Times*,

* I was informed at Belleville that the tides there average 5½ feet, and are three-quarters of an hour later than at New York.

† I was informed by a leading butcher of Hoboken, a reliable man, that he did not dare to use the hydrant water in the summer season, to wash his meat, as it quickly turned the latter green; a fact which did not hold when well-water was used.

Correspondence.

[Correspondents, in all cases, should sign their communications with their names and address in full—not necessarily for publication, but as a guarantee of good faith.—Ed.

☞ Notice.—Correspondents not intending their letters for publication must mark them "Private."

Fixed Gas from Paraffine Oil and other Products.

Cooperstown Gas-Light Co.,
Cooperstown, N. Y., May 21, 1873.

Mr. Editor: The Gas-Light Journal, which I prize so highly, has very little to say about *fixed* gas from paraffine oil, and other products of petroleum. I have been manufacturing for over three years in this village, this description of gas, and as the yield per gallon, with my retorts at the most perfect heat, is only 60 to 70 cubic feet, my price per thousand has to be much higher than the price of coal gas. I find from the most careful comparison with coal gas, that a burner consuming 1½ feet equal 6 feet coal gas. At No. 13 Dey street, New York city, a dark room is prepared to illustrate this perfectly.

As an old patron of your Journal, I would be pleased if Prof. Wurtz would give this matter a few moments attention, and write his conclusions to me. I most respectfully ask this for this reason.

I find it almost *impossible* to convince any of my customers that *oil* gas has a greater density than *coal* gas ("Comstock's Eliments of Chemistry," article 396, says, "A given quantity of oil gas is equal in illuminating power to four times the same quantity of coal gas.")

Under these circumstances a line from such an expert as Prof. Wurtz, would settle the matter, and confer a special favor on

Respectfully,
O. R. Butler.

[The Editor has much to say soon upon the important subject of Mr. Butler's letter. At the late organization of our National Gas-Light Association, a special committee was appointed to investigate and report upon this very subject, thus indicating that it is one not to be passed by with neglect, by the profession generally.—Ed.]

[The following was received without any accompanying letter or special address. We can but suppose that publication of it is desired. A far wider and more elaborate collection of statistics of this kind than the one here referred to will soon be begun, which must lead to results of the highest interest and value. —H. W.]

Result of the New Haven Circular.

Office of the New Haven Gas-Light Co.,
New Haven, Conn., May 20, 1873.

Dear Sir: Under date of November, 1872, a circular was sent to you from this office expressing the desire of this company ', to ascertain what, if any, ratio exists between the consumption of gas and the population of any given locality, with a view to determine whether there is any general law which may serve as a guide in determining the probable future demands for gas supply and storage capacity." and a promise was given to advise you of the results of the investigation.

Replies, varying greatly in definiteness, have been received from twenty-one companies in various parts of the country. Several of these have been given us as confidential, so that their publication is precluded. The result of the inquiry has been unsatisfactory, the extremes of reported consumption having varied from 2 2-3 to 10 2 3 cubic feet per individual in the ascertained or estimated population of different localities, while a mean has been about 5½ cubic feet. So far as any results have been deduced from the inquiry, they have led to the conclusion that the ratio of consumption to population is subject to so many contingencies not capable of mathematical statement, as to render the question one of local rather than general determination.

Regretting that nothing more practical has resulted from the inquiry, yet not entirely disappointed thereat, and thanking you for your contribution to the attempt at obtaining information designed to be of service to the gas companies of the country, I subscribe myself,

Yours respectfully,
F. E. Harrison, Treasurer.

Deprecation.

L. A. Ward's Office, No. 2 Exchange Place,
Rochester, N. Y., May 22, 1873.

Mr. Editor: In the last number of your Journal (Chemical Excerpts, No. 725) I find the following:

"* * * * but the gas companies do not want cheap and good gas, but that which will meter well." Is the statement true? So far as my knowledge or observation extends, there are not enough gas companies holding the views imputed to them, to give the slightest foundation for such a statement. On the other hand, I believe gas companies, and those connected with them, are doing more than all others to improve the quality and cheapen the cost of gas.

Yours respectfully,
L. A. Ward.

[The gentleman who has favored us with the above is in all respects earnest and zealous. He merely omitted to notice that our extract related to a public lecture delivered in New York. For the sentiments expressed therein, it would not be fair to make this Journal responsible, merely in consequence of having reported the same.—Ed.]

The New Westchester Suburbs—Water and Gas.

At the present time New York, even with its adjacent suburbs—including Brooklyn, Hoboken, Jersey City, Long Island, and Staten Island—is more densely populated than any other known city, not excepting London, Pekin, Chicago, or Paris, as shown by the table annexed:

POPULATION PER SQUARE MILE.

Chicago	1,344
San Francisco	1,661
Boston	2,278
Philadelphia	5,309
London	26,653
Pekin	28,393
Paris	30,150
New York	42,829

thus showing that New York with its present territory is nearly twice more populated than the city of London, with its 100 additional square miles.

Calculating roughly, there are about 990,000 people who have a permanent residence in this city, thus giving an average density of population, over the area occupied, of over ninety persons to the acre. The most crowded portions of the city are the Fourteenth Ward, consisting of 280 persons to the square acre: the Seventeenth having 290 to the acre; the Thirteenth 511: and the Eleventh not less than 332 persons to the square acre. This excessive pressure however, will be greatly modified as soon as the question of rapid transit is practically carried out.

* * * * * * *

Comptroller Green, as soon as the question of annexation was broached, entered into the question so far as the water supply would be affected. He stated that it had been proved conclusively that the Bronx and Saw-mill rivers are capable of yielding water enough to supply the upper portions of the new district.

The engineers of the Park Department also state that a supply from local sources could be easily obtained for the southern part of Westchester, amounting to about 60,000,000 gallons per day. This statement, however, is open to question, as it is not believed this yield could be kept up, and the supply required for New York city now being 80,000,000 gallons. The engineers have made a thorough survey of the water-sheds of the Nepperhan or Saw-mill River, Sprain Brook, Grassy Sprain Brook, the Bronx and Hutchinson Rivers, and the other water supply not naturally belonging to the Croton shed or its tributa-

ries, and their report is perfectly satisfactory, and no apprehensions need be feared of any deficiency of this commodity.

With reference to providing the new territory with gas, police, schools, and many other municipal privileges much has been said by those few who opposed the bill when befote the Legislature. At the present time the greater portion is already lighted, including the whole of Morissania, Tremont, Fordham, and nearly the whole of West Farms.—*N. Y. World.*

Tunnel in New York.

In the New York Senate, May 25, Mr. Graham introduced a bill to authorize the Hudson Tunnel Railroad Company to construct its railroad underground in the city of New York, and under the bed of the Hudson river, for the transportation of passengers and property to and from the city of New York to the State of New Jersey, in manner and upon a route to be designated and prescribed by commissioners appointed for that purpose. It provides that said railway shall commence at a point to be designated as hereafter prescribed, in said city and county of New York, between Chambers and Fourteenth streets, not more than 3,000 feet easterly from the line of docks on said river, and shall run from thence underground, and under bed of said river, so as to connect with a similar railway to be constructed under the bed of said river from the State of New Jersey.

The construction of the road is to be under the direction of two commissioners appointed by the Governor, the third to be appointed by the Mayor of the city of New York. The commissioners shall have power, subject to the approval of the Mayor and Common Council, to designate and establish the route or line of said railway, and the streets and docks which may be occupied by said company. The commissioners shall report any interference with public sewers, water or gas pipes, etc., none of which shall be interfered with unless by special permission of the Department of Public Works. The Legislature has power to alter or amend the act at any time.

This may be all very well for New York; but would it not have been polite to recoguize New Jersey in some way—say by condescending to the appointment of one commissioner from this State? But the bill merely assumes that a "similar railroad is to be constructed" from the State of New Jersey. We are not aware that any person or company has been authorized by our Legislature to do such work. But New Yorkers probably suppose that the Erie or the Pennsylvania monopoly will undertake it on their own responsibility. We shall see.—*Jersey City Times.*

Cooking by Steam.—The process of cooking by steam is by no means of recent invention, for in 1769 George Scott took out a patent for "A boiler, pot or utensil, to be made of any kind of metal, for the more convenient dressing of ships' provisions with sea water, or any kind of water; for making sea water fresh; for purifying and making sweet any kind of water; and for the more expeditious method of boiling any kind of fish, flesh, or provisions of any sort, and extracting broths or soups." In this vessel the process was carried on by steaming, the steam being conveyed from a vessel where it was generated through a pipe to a separate cooking vessel.—*Jour. Soc. of Arts.*

Obituary.—Columbus O'Donnell, one of the elderly, wealthy, and influential citizens of Baltimore, died on the 25th May. The deceased was for 30 years President of the old Baltimore Gas-Light Company.

The Coal Supply at Rhinebeck and Poughkeepsie is short. At the latter place the gas company has requested the city authorities not to light the street lamps until they can get more coal with which to make gas.

The "Jersey City Times" is hard on one of the Jersey gas companies. It says: "This office is no loafing place" is on a sign in the Hudson City gas office. They want no gas there worse than their own.

PRICES OF FOREIGN AND DOMESTIC GAS COALS.

[Reported Expressly for this Journal.]

JUNE 2, 1873.

DELIVERED IN NEW YORK.

English Cannel.			
Ince Hall	$17 00	@	18 00
Kirkless Hall	16 50	@	17 00
English Caking Coals.			
Newcastle Gas	$12 00	@	00 00
Liverpool caking	11 50	@	12 00
British Province Coals.			
International—At Sydney, $2 50 in gold			— —
Block House—At Mines, $2 50, Gold			0 00
Little Glace Bay—At Mines, 2 50 Gold			— —
Pennsylvania Coals.			
Penn Gas Coal—At Amboy	$8 50	@	0 00
Westmoreland—At Amboy	8 50	@	0 00
(In New York both the above coals $9 10)			
Shafton	9 10	@	0 00
Youghiogheny—At Baltimore	7 50	@	0 00
West Virginia Coals.			
Murphy Run	$8 00	@	8 75
Despard—At Baltimore	6 30	@	0 00
West Fairmont	8 60	@	0 00
American Gas Coal	8 50	@	0 00
Fairmont	8 50	@	0 00
Newburgh Orrel	8 50	@	0 00
Pinnickinick	8 50	@	8 75
Cloverhill of Virginia	5 50	@	6 00
McKenzie Compound Mixture			— —
American Cannel Coals.			
Peytona of West Virginia	$15 50	@	00 00
Darlington of Pennsylvania			— —
American Cannel	$14 00	@	00 00
Asphalts.			
Albertite of New Brunswick	$— 00	@	— 00
Ritchie Mineral of West Virginia	22 50	@	00 00
Trinidad Bitumen	— —	@	14 50

MARK LEVY,

PRACTICAL BUILDER AND CONTRACTOR OF GAS WORKS,

OF THE LATEST IMPROVED PLANS.

No. 26 West 43rd Street, New York.

Patentee of a new process of manufacturing Gas from Wood, Etc. 321-2t

WOOD GAS.

THE INVENTOR AND PATENTEE OF A NEW AND improved Retort for manufacturing Gas from Wood, Turf, etc., would call the attention of Gas Companies, and the public generally, to an invention which will be a great saving to the community, as they can thereby supply an exceedingly cheap, clear, and brilliant light, besides useful products in profusion.

Companies desiring to change from the Coal to the Wood process, or private individuals wishing to purchase rights for Hotels, Factories, Private Houses, Cities, Counties, or States, will be furnished with all necessary information, by addressing the Inventor. MARK LEVY,

334-2t No. 26 West 43rd Street, N. Y.

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BOWDITCH.—THE ANALYSIS, TECHNICAL VALUATION, Purification, and Use of Coal Gas, with illustrations, 8vo. cloth. Price, $4.50.

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BOWER—Gas Engineer's Book of Reference, illustrated, 4to. Price, 75c.

CLEGG—Treatise on the Manufacture of Coal Gas, 5th edition, enlarged, 4to, cloth. Price, $10.50.

COLBURN—The Gas Works of London, 12mo, boards. Price, 60 cents.

GAS CONSUMERS' GUIDE—A Hand Book of Instruction on the proper management and economical use of gas, etc., etc. 12mo., cloth. Price, $1.00.

HUGHES—Gas Works and Manufacturing Coal Gas, 12mo Price, $1.20.

MASON—The Gasfitter's Guide, paper. Price, 50 cents.

D'HURCOURT—De l'Eclairage du Gas. Par E. R. Hu court, 3d edition. Paris, 1863; 8vo. and plates, $6.00.

RICHARD—Gas Consumer's Guide, 12mo. Price, 50 cents

SWEET—Special Report on Coal, showing its Distribution, Classification, and Cost, delivered over different routes to various points in the State of New York, and the principal cities on the Atlantic Coast. By S. H. Sweet, with Geological Maps. 1 vol. 8vo. cloth, $5.

MODERN STREET LIGHTING.—By William Sugg. 8vo. paper. 75 cents.

WILKINS—How to Manage Gas; 24mo., paper. Price, 25c

SCHILLING—Traite d'Eclairage par le Gaz. Price, $22.

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St. John and Cartwright's NEW IRON COMPOSITION

Has purified, per bushel, on a single test, 10,000 feet of Westmoreland Gas. With revivification lasts indefinitely. Surpasses in POWER and ECONOMY all known materials. Saves largely in FIRST COST, SPACE, LABOR, SUPERINTENDENCE, and all current expenses. Will purify *easily* sulphurous gas, wholly *unmanageable by lime.* Takes out *all the ammonia.* Now operating in the following Gas Works: Harlem; New York (21st street); Port Morris; Hunter's Point; East New York; Worcester, Lynn and Cambridge, Mass.; Lewiston, Maine; St. Albans, Vt.; Pawtucket, R. I.; Meriden, Ct., and being introduced in many other places.

Cost 70 cents per bushel. One bushel for each square foot of Purifier sufficient. Rights to use for life of Patents, for daily makes of gas in thousands; under 25,000 $200; under 50,000, $400; under 100,000, $500; $250 additional for each additional 50,000 per day.

For further information and instructions, apply to
ST. JOHN & CARTWRIGHT,
21st Street and Avenue A, New York Gas Works.

☞ Immediate arrangements are urged, as the demand for e prepared composition is increasing *so rapidly* that delays supply may occur.

B. S. BENSON.

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Several Thousand 3, 4 and 6 inch Cast Iron GAS PIPES on hand, for immediate delivery.

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ALL KINDS OF CASTINGS AND APPARATUS FOR GAS WORKS,

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For Retort and other houses. Retorts and all castings required for setting them in the latest and most improved model. WASHERS, CONDENSERS, SCRUBBERS and EXHAUSTERS for relieving the Retorts from pressure. PURIFIERS, varying from 2,000 to 2,000,000 cubic feet daily purifying capacity.

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With cast iron guide and suspension frames. GAS GOVERNORS or REGULATORS, STREET MAINS, from 1½ to 48 INCHES DIAMETER, for WATER or GAS. Street Main connections, such as BRANCHES, BENDS, DRIPS, SIEVES, etc.

STOP VALVES, from 3 to 30 inches, for both Water and Gas.

Wrought Iron Work.

All the Smith and Sheet Iron work required in and abou Gas Works. 226-tf

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THE AMERICAN

GAS-LIGHT JOURNAL

AND

Chemical Repertory,

PUBLISHED ON THE 2D AND 16TH OF EACH MONTH,

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A. M. CALLENDER & CO.,

PROPRIETORS.

EDITOR—PROF. HENRY WURTZ.
Sec'y of the Gas-Light Association of the U.S.
Editor's Private Office, 12 Hudson Terrace,
Hoboken, N. J.
(Immediately fronting the Ferry Houses.)

This is a recognized official organ of—
LIGHT, HEAT, MINING INTERESTS, STEAM,
WATER-SUPPLY, PATENTED INVENTIONS,
VENTILATION, SANITARY IMPOVEMENT, AND
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PHILADELPHIA—COE, WETHERILL & Co., Ledger Buildings, Phila.
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☞ All communications to be addressed to "THE EDITOR, No. 42 Pine Street, Room 18, New York.

FRIDAY, JUNE 2, 1873.

WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of these subjects a pleasure, or a profession.

Subscribers would confer a favor upon us by remitting *CHECKS*, or *POST OFFICE MONEY ORDERS*, as we are frequent losers where money is enclosed in letters.

☞ NEWS AGENCY.—The American News Company, 11 and 121 Nassau street, New York agents for this Journal. News dealers will please send orders to them.

NOTICE.

☞ *All Collections for Advertisements, Subscriptions, etc., are made directly from this Office. We have Agents to solicit the same, but they are not authorized to Receipt for Money.*

TO OUR SUBSCRIBERS AND PATRONS.

In making remittances for subscriptions, always procure a draft on New York, or a POST OFFICE MONEY ORDER, if possible. Where neither of these can be procured, send the money, but always in a REGISTERED LETTER. The registration fee has been reduced to fifteen cents, and the registration system has been found by the postal authorities to be virtually an absolute protection against losses by mail. ALL Postmasters are obliged to register letters whenever requested to do so.

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SPECIAL NOTICE.

The private office of the Editor of this Journal, for consultation and correspondence; and as Secretary of the Gas-Light Association, is at

No. 12 Hudson Terrace,
Hoboken, New Jersey.
(Immediately fronting the Ferry Houses.)

INTERESTING GAS-LITIGATION IN NEW-ORLEANS.

In our next issue we shall give full extracts from the proceedings, together with a decision recently arrived at by the Supreme Court of the State of Louisiana, in a very curious suit, brought *ostensibly* by that State against the New Orleans Gas-Light Company. We can now merely skim over the general history of the case, and state the general result.

Into the various discussions of the subject that have been submitted to us, much has entered that we must rule out from these columns, if only for the reason that mysteries are involved that neither the majority of our readers nor we ourselves would be competent to comprehend. Our meaning here will be manifest on stating that in some of these articles the awful and inscrutable term "carpet-baggers" comes in, pretty much in every sentence where it can be made to fit in. We must therefore pretermit the personalities and the local politics, expunge the epithets, and delete the diatribes. The facts, pure and simple seem sufficiently sensational, and iniquitously interesting, even to satisfy the devotees of the *Police Gazette* or the *Sunday Mercury*.

The original charter of the New Orleans Gas-Light Company contains the "exclusive privilege" to supply gas until April 1, 1875. This charter was amended March 1, 1860, by an act which, in consideration of a reduction in price and certain other concessions to be immediately made for the benefit of the citizens of New Orleans by the company, extends its existence until 1895, but without exclusive privileges. In other words, the act permits the company to sell gas for 20 years longer, provided it will do so against any competing company.

The purport of this Act of 1860 was to extend the area of gas-lighting in the city, and to reduce the price paid by consumers. The gas company was required to lay fifteen miles of main pipes before July 1, 1863. The levee front was to be furnished with main pipes free of cost to the city whenever the Council should require them. The charter of the company was extended for twenty years from 1875, and the capital was increased in order to effect this, a million of dollars. The price of gas was reduced to $4 per thousand feet.

In 1870, ten years after this act was passed by the Legislature, accepted by the city and complied with by the company, an enterprising association of gentlemen (whose names we have and will give hereafter) obtained an act of incorporation for the "Crescent City Gas-Light Company"—a new company—with the *exclusive* privilege of making and selling gas during 50 years from the date of the expiration of the old company's charter. The act of March, 1860, extending the life of this company until 1895, had been overlooked. When, therefore, the managers of the new company undertook to sell their valuable stock, they were met by the fact that the fruition of their monopoly must be postponed twenty years! Here was a "state of things" for men of enterprise. "Phansy their phelinx!"

It appears, however, that these lofty souls were not to be baffled thus. They rose up to the occasion. The next move was to institute proceedings with the object of attempting to annul the operation of the act of 1860, and thus terminate the life of the old company in 1875. A committee of the Legislature, which is asserted to have been made up of their stockholders, was appointed to investigate the affairs of the old company. After six weeks of almost daily attendance at its office, examining its accounts and minutes, a report was made to the Legislature, the tenor of which was to the effect that the old company had substantially complied with all the conditions of the act extending its life, but that the title of that act was defective, and therefore it ought to be annulled.

The Attorney-General of the State (the name of a brother of whom, by what certainly is a very remarkable coincidence, appears on the list of original stockholders of the new Company) opened suit in the name of the State; one of the consequences of which was, as the local newspapers complain, that "the taxpayers were left to bear the expense."

The next chapter in "this strange, eventful, history" is thus related by the *Daily Picayune* of May 11th:

"After the case was had been argued on both sides, and submitted to the District Court, Dibble, Judge the decision was withheld for several weeks. During this interval strenuous efforts were made to induce the old company to purchase this gold mine of a charter. For a certain sum of money, to be eventually made good out of the gas consumers, it was proposed to quash the proceedings, to muzzle Dibble, and transfer this fifty years' monopoly to the old company. To the honor of the directors and stockholders of this company, the offer was rejected, and Dibble immediately gave judgment, overruling the exception taken by counsel and annulling the act *which opens the supply of gas to competition in two years*, so as to enable a NEW MONOPOLY to begin a career of half a century without check or responsibility."

We have before us the whole story of the proceedings above referred to by the *Picayune*, which must wait, however, till our next. To wind up this preliminary notice, the case was argued before the Supreme Court of the State, on behalf of the old company, as defendants, by the Hon. John A. Campbell (ex-Justice of the U. S. Supreme Court), and T. J. Sommes, Esq. (both of whose arguments we have procured):—and the decision now rendered by that Court sustains the exception overruled by Judge Dibble, that the act of March, 1860, cannot be impeached before it comes into operation, and that it will be time enough to decree the old company out of existence when it does any illegal act after 1875. Thus the new company, to enforce its monopoly against the competition of the old company, must come to the front in 1875, open suit on that naked issue, and pay its own costs.

THE GOODWIN METER WORKS.

During a recent visit to our sister metropolis, Philadelphia, the Editor enjoyed the satisfaction of "doing" this superb establishment; which, while one of the finest, in some respects doubtless the most perfect of its kind in the country, has been entirely created and brought from its very first inception to its present state of working efficiency within six months time! This is a feat of organization and execution that is rarely paralleled. The name of the head of the new firm, William Wallace Goodwin, has long been familiar to our readers, as that of one of our most thorough and scientific gas-experts, as well as an energetic and reliable man of business. His name has also been identified with this special branch of meter-manufacture, for many years.

It had been our intention to make up from notes taken on the spot a complete account in detail of the exquisite machinery and manipulations which we witnessed in going through these

works, but space cannot be found at present; and we can only urge every one of the Fraternity who visits the Quaker city, to take Mr. Goodwin in his rounds. He will qe found, as always, full of cordiality and gentlemanly urbanity to all in (as well as out of) the profession. The locality is central, 1014 Filbert street.

The machinery used in this manufacture is similar, though of course with the needed modifications, to that used for the machine-made watches and clocks of the present day; so that all the parts of all the meters are exactly alike and interchangeable. The extremity of practical accuracy is thus secured, as will be obvious to all; and in fact, on glancing over the books of the sworn inspector, through whose hands every Goodwin meter passes, I did not find any case in which the error, above or below the normal, was more than *one half* of one per cent.! Our own complete inspection of the establishment enables us to endorse fully the printed statement of Mr. G. that he has "secured the services of a corps of assistants whose reputation for talent, experience and workmanship are first-class in their respective branches, and who stand foremost in the ranks of meter makers." He also states that the majority of his workmen are the "oldest in the business," which we fully believe must be true. Some among them are certainly unsurpassed in skill and ingenuity. They make (and in many cases invent) all their own tools.

In connection with Mr. Goodwin himself, we have much more to say, at an early day, regarding his new and ingenious dial for the Jet Photometer, made now by him, in which the candle-power is shown at a glance, by inspection; instead of requiring calculation and reference to tables. Since our visit to Mr. Goodwin, we hear that a patent has been issued to him for this valuable device. It has been fully and lucidly described in a little illustrated pamphlet work by Mr. G., in which he enters into the whole subject of the Lowe photometer and the improvements that have been made therein by Sugg, Kirkham and himself. Tnis pamphlet should be procured by the whole profession. Space permits us now only to add that the new establishment is already crowded with orders, and constantly worked to its utmost capacity; and that it is a source of gratification to find that in this case science, skill, and energy have been rewarded with their due meed of success.

☞ Since the above was written, an advertisement has been sent in by the firm of William W. Goodwin & Co., which will be found in its appropriate place.

THE MIDDLETOWN TUBE AND IRON COMPANY.

The advertisement of this new manufacturing establishment, for wrought iron piping for gas, steam, water, etc., located at Middletown, Dauphin County, Pa., will be found on this page. This is a joint stock Company, with a capital of $60,000, now in successful operation and making daily from ten to twelve thousand feet of pipe of various sizes. The organization is a sufficient guarantee to the gas fraternity of skill, good faith and reliability, the President being Thomas R. Brown, Esq., Chief Enginoer of the Philadelphia Gas Works. The other officers are

Joseph H. Landis—Secy. and Treas.
Wm. H. Brines—Superintendent.

A sample of the gas pipe made by this Company has been inspected by us, and was plainly in every way a superior article.

Errata in Last Issue.

The Editor did not revise the proofs of editorial in the last issue, and hence a few lapses, which might as well receive attention.

—In the third line of the "History of the Gas Strike," after the word "strike" supply *virtually commenced.*

—After line 15 from bottom of same column, supply the name of C. L. Everitt, President New York Gas Company (Author of the letter quoted.)

—Page 171, 1st column, in 2d line of article on Oxygen-Illumination, after word "investigations," supply *brought to us.*

—In next article, same column, for "metaphorphism," read *metamorphism.*

—This same article was taken from the *Engineering and Mining Journal*, its authorship having been due to Commissioner Raymond, the Editor of that Journal. Credit was omitted.

—Also, credit Excerpt No. 725 to the New York *World.*

IMPROVEMENTS IN STREET LIGHTING.

CITY CLERK'S OFFICE, CITY HALL,
SPRINGFIELD, MASS., MAY 15.

J. W. BARTLETT, 569 Broadway, N. Y.—Dear Sir: Our people are very much pleased with your Improved Street Lamps, and consider them far ahead of any they have yet seen. Your Patent Improved Torch and Key for lighting street lamps has been in use here for several months, and gives perfect satisfaction. Much time, labor and gas are saved.

A. T. FOLSOM, City Clerk.

OFFICE PLYMOUTH CO., REGISTRY OF DEEDS,
PLYMOUTH, MASS, May 20.

J. W. BARTLETT, New York.—Dear Sir: We are still using the Patent Torch and Key procured from you for lighting our street lamps, and are delighted with it.

W. S. DANFORTH, Register.

WORCESTER, MASS., May 10.

We have the Bartlett "Boulevard Lamps" in use in this city for a year past. They have given perfect satisfaction. They are the most durable lamp we have had in use. Only one glass has been broken, and that by heavy ice falling from the City Hall.

GEORGE SPURR,
Chairman Com. of Aldermen on Lamps and Gas.

"A new improvement which seems to meet the wants of the people—the addition of a band of ground glass raised upon the globe of the Bartlett Boulevard Street Lamps, above the light, gives a prominent place to the name of the street. The letters, three inches in heighth, in round-faced characters, stand out boldly, and when it is done throughout all the streets, New York will be the best lighted and best street-lamp-directed city in the Union."—*N. Y. Com. Advertiser.*

"An improvement has been made in the lettering of the Bartlett Lamp. By the new method the glass itself is lettered just above the supporting ring. Being transparent, this affords a clear and beautiful legend."—*N. Y. Tribune, May 16.*

MIDDLETOWN
Tube and Iron Co.
MANUFACTURERS OF
Wrought Iron Pipe
For Gas, Steam, Water, Etc.

WORKS—MIDDLETOWN, PENN'A.
OFFICE—228½ WALNUT ST., ROOM 2, PHIL'A.

THOMAS R. BROWN, President.
JOS. H. LANDIS, Sec'y and Treas'r.
335-1y WILLIAM H. BRINES, Sup't.

SITUATION WANTED by a competent Machinis and Gas Engineer, who has had much experience in erecting and altering Gas Works, and the Manufacture of Gas—one who is not afraid to work. No objection to a small or ordinary Works, if in a growing place. Can furnish reference as to ability, etc. Address GAS ENGINEER, Station F New York Post Office. 335

A **POSITION WANTED** AS MANAGER OF A small Gas Works, by one understanding thr Manufacture of Gas in all its branches—Laying Mains, Setting Meters, Etc., and willing to work. No objection to any part of the country. Address MECHANIC, in care of THOMAS WOODS, Esq., Franklin, Ind. 335-1t

PROPOSALS FOR COAL TAR.

OFFICE OF THE ALBANY GAS-LIGHT CO.,
59 STATE ST., ALBANY, NEW YORK.

THIS COMPANY INVITE PROPOSALS FOR THEIR production of COAL TAR, per ton of Coal Carbonized. Bids to be received before the 25th day of June next, addressed to the undersigned, who will give any further information desired. S. W. WHITNEY, Sec'y.
334-3t

A NEW INVENTION FOR LIGHTING STREETS.

FROM REPORT OF
THE FRANKLIN INSTITUTE.

PHILADELPHIA, Jan. 20, 1873.

The Committee on Science and the Arts, to whom was referred for examination

Dyott's Patent Street Lamp.

Report having given it a careful examination, that they deem it superior to other Street Lamps in the following particulars:

It has a *double* semitransparent top with an intervening air space, which keeps the top cool, and prevents that breakage of glass so prevalent in other Street Lamps, and by the arrangement of its drafts more complete combustion is produced, and a greater amount of light is obtained from a given quantity of gas. Its semitransparent Reflector transmits sufficient light to illuminate the upper portion of surrounding buildings, and reflects the light where it is wanted, around and below. It also shelters the heated glass globe from rain, hail, and snow, and prevents breakage. It is peculiarly well adapted to display Street Names. Its arrangement and facilities for cleaning are excellent. It possesses decided advantages over other Street Lamps, and its tasteful design, in connection with its moderate cost and the durability of its construction, commend it as an article for general street and other uses.

By order of the Committee.
D. S. HOLMAN, Actuary.

THE EXPOSITION AND INDUSTRIAL FAIR OF KINGS COUNTY, N. Y.

FIRST DIPLOMA Awarded to M. B. DYOTT for Street Lamps of superior excellence, at the Annual exhibition at the City of Brooklyn, N. Y., 1872.

ATLANTIC CITY, August 20, 1872.

We the undersigned, Mayor and Members of Council of Atlantic City, N. J., having had twenty of Dyott's Patent Street Lanterns in use for some months, take pleasure in saying they have given entire satisfaction. Having no doors they are not subject to exposure, are durable, beautiful and easily cleaned—are the best we have seen or used, and have no doubt they will be generally adopted, when their advantages become known to Gas Companies and City Governments.

(Signed by the Mayor and every Member of the City Council.)

We the undersigned citizens of Atlantic City, having Dyott's Patent Street Lamp at our Hotels, fully concur in the recommendation of the same by our Mayor and City Council hereto annexed.

WILLIAM G. BARTLETT,
ALBERT BROTHERS,
BARCLAY S. SMITH,
CHARLES PALMER.

For further particulars address or call on
M. B. DYOTT,
114 South Second Street,
Philadelphia, Pa.

YOUGHIOGHENY
AND
CLOVER HILL
GAS COALS.

We have made arrangements by which, for the first time the celebrated

YOUGHIOGHENY GAS COAL

will be brought to the seaboard.

It is mined on the banks of the Youghiogheny River, near Pittsburgh, and is universally acknowledged to be the BEST GAS COAL known in the world. It will be shipped East and South from

Baltimore, Alexandria, and Georgetown,

AND WEST FROM

Cleveland.

We also offer the well-known

CLOVER HILL GAS COAL,

from Virginia, shipped from

Richmond.

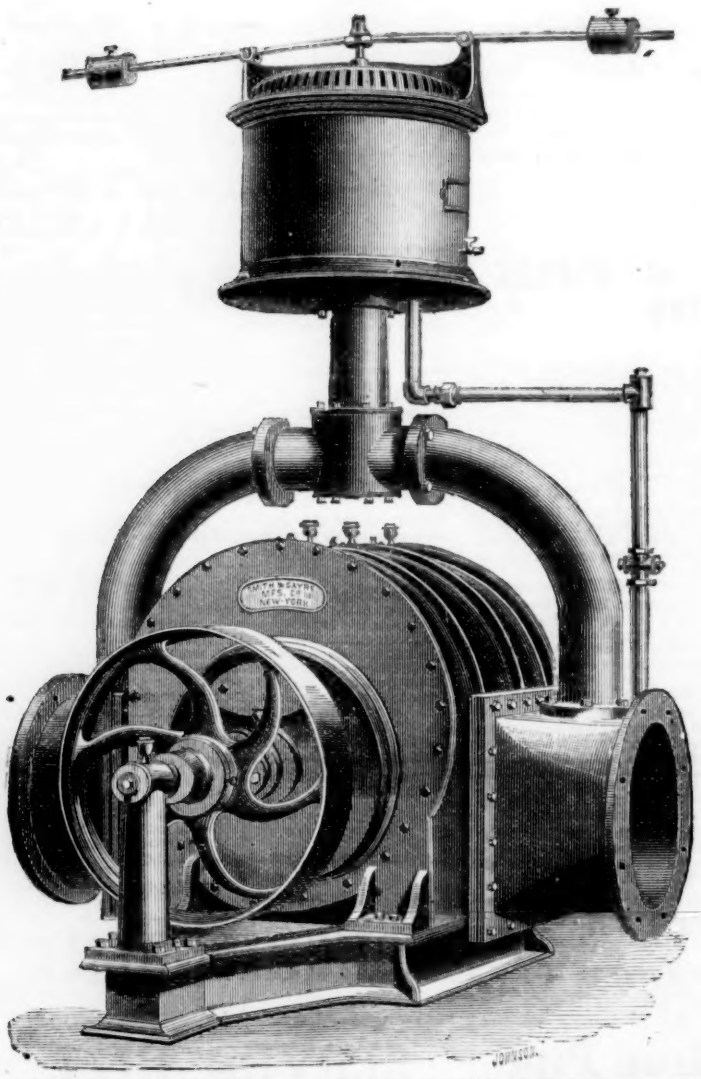
This Coal comes from the oldest and deepest mine in America, having been worked for fifty years, and has a wide and favorable reputation.

NICHOLSON & WELD,
111 BROADWAY, N. Y.

SMITH & SAYRE MANUFACTURING COMPANY.

The Mackenzie Patent Gas Exhauster

And Patent Compensator.



They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas, and add very much to the durability of the retorts, either clay or iron. The Compensator obviates entirely the necessity of water-joints, is compact, durable, cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.

We are also sole proprietors and manufacturers of the

MACKENZIE PATENT BLOWER, PATENT CUPOLA AND SMELTING FURNACE.

The Blower is a Force Blast machine, durably built, and can be driven with one-third the power required to drive the ordinary Fan.

The Cupolas are manufactured in sizes to melt from 1 to 30 tons per hour, will save one quarter of the time required by the old style Cupola, and 33 per cent fuel. Address

G. G. PORTER, President.

JAMES M. SAYRE, Treasurer.

CHARLES W. ISRELL, Secretary.

OFFICE, 96 LIBERTY STREET, New York.

AMERICAN

GAS SCREEN MAN'F'G COMPANY.

TO GAS-LIGHT COMPANIES.

Your attention is respectfully called to the GAS SCREEN now being manufactured by the American Gas Screen Manufacturing Company, under the patents granted to E. DUFFEE, and are pleased to submit the following points of their excellence and superiority over all other screens now in use.

The Screen is made with an oak frame, interlaced with split rattan, drawn through holes at regular intervals in the Frame and cross-pieces, the edges of the frame being grooved to prevent abrasion.

The advantages of the screen are:

1st. The large purifying surface, the construction of the Screen giving over three-fourths of the surface for the gas to penetrate the lime.

2d. On account of the free passage of the gas through the Screen the pressure is reduced, thereby preventing the accumulating of carbon on the retorts.

3d. The saving of lime and labor, as the Screens are not liable to clog, and are easily cleaned.

4te Their cheapness and simplicity of construction.

5th. Their DURABILITY—they can be used longer than any other now used.

Testimonials.

PROVIDENCE, RHODE ISLAND, March 21st, 1872

E. DUFFEE, Esq., Agent, etc.

Dear Sir: The Trays manufactured by you for our West Station were put in use in September last, and have *given perfect satisfaction.*

The frames are well put together, and I see no reason why they will not last for a long time. The *very large amount of open space* in these Trays gives the gas an easy passage, and brings it into contact with the lime much better than when the space is so contracted, as is the case in most of the other Trays in use.

The pressure thrown upon the retorts by contracted passages is very great, and were gauges used more frequently than they now are in many gas-works, this facat of having *open Trays* would become more apparent to mangers of gas works. The digerence in pressure at this station in passing the gas through your purifiers, is two-tenths (2-10) inches.

The amount of gas purified, per bushel of lime used to this date, is six thousand five hundred and fifty six (6,556) cubic feet.

Respectfully yours,
JAMES H. ARMINGTON, Supt.

BOSTON GAS-LIGHT CO., Dec. 1871.

Dear Sir: In answer to your inquiry how we like your Patent Tray for dry gas purifiers, I take pleasure in saying we have used them exclusive of all others, for the last three years, and think them far ahead of any yet offered. The surface being nearly three times that of any other Tray, and their lightness and durability perfectly satisfactory.

Yours respectfully,
A. M. GILES.

EDWARD DUFFEE, Esq.

EAST BOSTON, JUNE 15, 1871.

Gentlemen: We have used your Screens some five years. They give perfect satisfaction.

I consider them *by far the best Screen* for Dry Lime Purifiers I have seen. Yours truly, A. M. NORTON, Supt.

CHELSEA, May 1, 1871.

Mr. E. DUFFEE.

We are using your Purifying Trays, and find them to be the *best of any* that I have used, and will *purify more gas with less pressure* than any tray that I know. I can fully recommend them, after four years trial, to any Gas Superintendent with perfect safety, as the *cheapest and best Tray made.*

Yours truly, JOHN ANDREW, Sup't.

DORCHESTER, March 3, 1870.

Mr. E. DUFFEE.

Dear Sir: We have had your Gas Trays in constant use for almost one year and six months, and find them superior to any others we have ever used, both in point of economy and efficiency. Truly yours, W. B. BROOKS,
Agent Dorchester Gas-Light Co.

JAMAICA PLAINS, MASS., June 21, 1871.

EDWARD DUFFEE, ESQ.

Dear Sir; The Trays ordered by this company three years ago, are getting somewhat worn. I wish to say here that I consider your Trays to be superior to any yet invented, therefore please make us another set at the price named, to be like the sample shown in every way, and oblige Yours truly
JAMES F. ROGERS,
Sup't Jamaica Plains Gas-Light Co.

BROOKLINE, June 11, 1871.

E. DUFFEE, ESQ.

Dear Sir: You will please make a set of Gas Trays for this company as soon as convenient, at price named. In regard to the merits of the Tray, after having them in constant use for over two years, I will say that I consider them *superior to any Tray* manufactured in this country. Respectfully yours,
H. A. ALLYN,
Sup't Brookline Gas-Light Co.

BANGOR, August 2, 1870.

EDWARD DUFFEE, Esq.

Dear Sir: Yours of the 20th ult. is received. In regard to your Gas Trays, I take pleasure in saying that they have been in use over two years, and have given perfect satisfaction and they are in good order at the present time; should have no hesitation in recommending them, believing they are the most durable and easiest kept in order of any with which I am acquainted. Respectfully yours,
W. H. PERRY, Sup't.

OFFICE OF THE SPRINGFIELD GAS-LIGHT CO.'
SPRINGFIELD, MASS., OCT. 10, 1871.

Mr. WARD,
President Hartford Gas-Light Co.

Dear Sir: I have been using Gas Screens made by the American Gas Screen Company, for nearly a year, and find them superior in every way to the wooden Screens made and formerly used by the Springfield Gas-Light Co. I can purify more gas with the same quantity of lime, there being more surface to the Screens; and I consider them more durable, and recommend them to your consideration.

Yours with great respect,
GEORGE DWIGHT.

ROXBURY, June 14, 1872.

EDW. DUFFEE, ESQ.

Dear Sir: In answer to your inquiry regarding your Patent Gas Screens, I am happy to be able to say, that after nearly three years constant use we are perfectly satisfied with them being able to purify over fifty pet cent. more gas with them, than with any other Screen we have used.

Yours respectfully,
THOMAS J. FISHOU.

OFFICE DETROIT GAS-LIGHT CO.,
DETROIT, MICH., April 22, 1872.

AMERICAN GAS SCREEN MANUFACTURING CO., HAVERHILL.

Gentlemen: The Screens bought of you work far better than any we have ever used. As a proof, we have with the same quantity of lime purified *twenty per cent.* more gas with your Screens than with any others, and the work well done. The workmen are also better pleased with them—they being light and handy to work. They also relieve the pressure very much upon the retorts, and I cheerfully give yau my experience.

Yours truly.
P. E. DEMILL. Secretary.

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Address **A. P. JAQUES, Treas.,**
Amer. Gas Screen Man'f'g Co., Haverhill, Mass

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SAMUEL DOWN, President American Meter Company, N. Y.
C. VANDERVOORT SMITH, Engineer Manhattan Gas-Light Company, N. Y.
CHARLES MOWTON, Engineer New York Gas-Light Company, N. Y.
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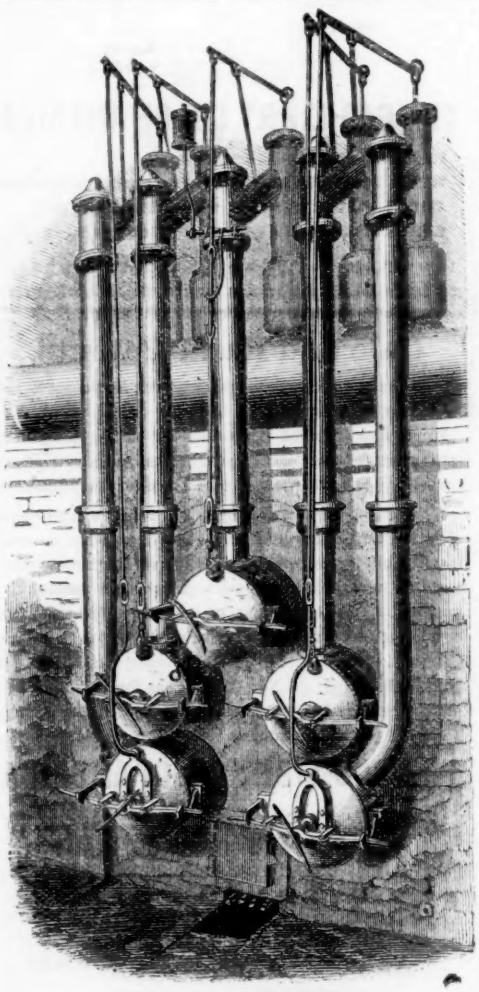
JAMES R. SMEDBERG, Consulting Engineer, San Francisco Gas-Light Co., Cal. [254-



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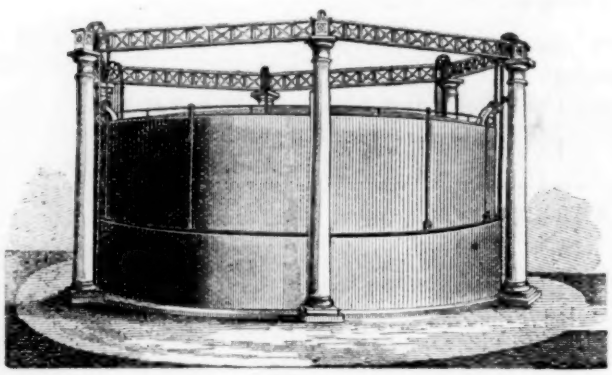

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E. W. McGINNIS, Secretary and Treasurer.
JOHN P. KENNEDY, Chief Engineer.
LEONARD D. GALE, Consulting Chemist.

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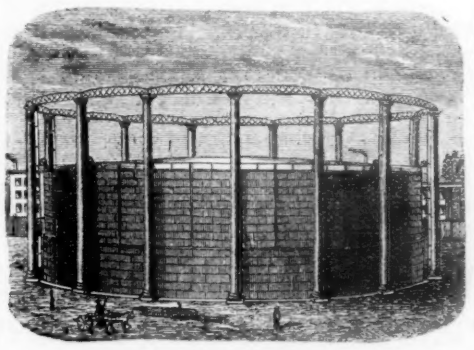

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This Company offer their very superior Gas Coal at lowest market prices.

It yields 10,996 cubic feet of gas to the ton of 2,240 lbs. of good illuminating power, and of remarkable purity; one bushel of lime purifying 6,792 cubic feet, with a large amount of coke of good quality.

It has been for many years very extensively used by various Gas Companies in the United States, and we beg to refer to the Manhattan, Metropolitan, and New York Gas Light Companies of New York; the Brooklyn and Citizen's Gas Light Companies of Brooklyn, N. Y.; the Baltimore Gas Light Company of Baltimore, Md., and the Providence Gas Light Company, Providence, R. I.

The best dry coals shipped, and the promptest attention given to orders. 284-1y.

PLYMOUTH IRON WORKS.

MANUFACTURERS OF

Cast Iron Gas and Water Pipe,

FROM TWO INCHES TO SIX FEET DIAMETER

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Make Valves (Double and Single Gate ,¾ inch to 36 inch—outside and inside screws, Indicator, etc.) for Gas, Water and Steam—also

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We would refer to the following among many other Companies using them:

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Metropolitan, New York; Manhattan, N. Y.; Buffalo, N. Y.; Brooklyn, N.Y. Rochester, N. Y.; Philadelphia, Pa.; New Orleans, La.; Cincinnati, Ohio; Cleveland, Ohio; Columbus, Ohio Chicago, Ill.; Quincy, Ill.; Springfield Mass.; Milwaukee, Wis.; St. Louis, Mo.; Louisville, Ky.; Memphis, Tenn.; Galveston, Texas.

WATER COMPANIES.

Burlington, Vt.; Keene, N. H.; Concord, N. H.; Springfield, Mass; Worcester, Mass.; Buffalo, N. Y.; Auburn, N. Y.; Utica, N. Y.; Troy, N. Y.; Philadelphia, Pa.; Cincinnati, Ohio, Cleveland, Ohio; Dayton, Ohio; Peoria, Ill.; Detroit, Mich.; St. Paul, Minn.; New Orleans, La.; Memphis, Tenn.

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Manufacturer of

GAS BURNERS.

GAS HEATING AND COOKING APPARATUS,

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Practical Builders.

And Contractors for the Erection of Gas Works,

MANUFACTURERS OF ALL THE LATEST AND MOST IMPROVED APPARATUS AND TOOLS FOR THE MANUFACTURE & DISTRIBUTION OF COAL GAS.

☞ WORKS AT THE RAILWAY DEPOTS,

FORT WAYNE, INDIANA.

We manufacture Bench Castings, Washers, "The Immersed Multitubular," and Atmospheric Condensers, Wet and Dry-Lime Purifiers, Dry Center Seals, Telescopic and Single Gas Holders, Wrought Iron Trussed Roof for Iron or Slate, Wood and Iron Trays for Purifiers, Coke and Coal Carts, Wrought Iron Screening Shovels and Castings, and Wrought Work of every description for Gas-Works.

As Mr. Murray is a Practical Draughtsman, we will furnish plans and specifications to parties or associations, or will wait personally upon parties contemplating the construction of new works, or the alteration or extension of old ones.

The most satisfactory references can be given, if required, of the experience and commercial fairness which characterizes our dealings.

We would respectfully invite Western men to call and see our patterns and works here. MURRAY & BAKER,
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THE AMERICAN METER COMPANY.

Organized under the General Manufacturing Laws of the State of New-York.

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Trustees:

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THOMAS C. HOPPER, Superintendent at Philadelphia.

This Company is now prepared to furnish WET AND DRY GAS METERS, STATION METERS, GOVERNORS, PRESSURE INDICATORS AND REGISTERS, SERVICE and METER COCKS, and all articles in their line appertaining to the use of Gas Works.

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West Twenty-Second Street, New York. Arch and Twenty-Second Streets, Philadelphia. 321 Washington Street, Boston, will meet with prompt attention.

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Goodwin's Improved Lowe's Jet Photometer.

W. W. Goodwin is the author of the History and Principles involved in the use of Lowe's Jet Photometer. (Patentee and we are the SOLE MANUFACTURERS of the ORIGINAL and ONLY DIAL whereby the CANDLE POWER and PRESSURE can be instantly read.)

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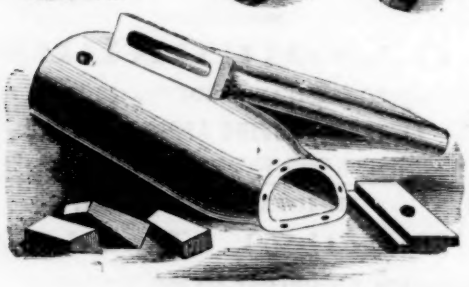
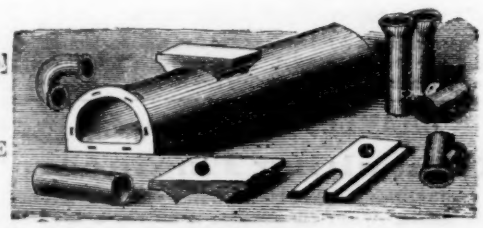


The Only XX Fire Brick.

☞ RETORTS OF THE VARIOUS SIZE KEPT ON HAND.



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ESTABLISHED 1848.

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Continue as heretofore at the OLD ESTABLISHMENT, Nos. 1115 and 1117 Cherry Street, Philadelphia, Pa.,

To manufacture Wet and Dry Gas Meters, Station Meters, Experimental Meters, Meter Provers, Centre Seals, Governors, Pressure Registers, Indicators, Photometers, and all kinds of Gas Apparatus; Also furnish all other Articles appertaining to the use of Gas Works.

From our long Practical Experience of the Business (covering a period of 20 years) and from our personal supervision of all Work, we can guarantee all orders to be executed promptly, and in every respect satisfactorily.

J. Wesley Harris, Washington Harris, William Helme.

1849. HARRIS, GRIFFIN & CO., 1873.

12th and Brown Streets, Philadelphia, Penna.

and 49 DEY STREET, NEW YORK CITY.

Manufacturers of WET AND DRY GAS METERS, STATION METERS, SHOW AND TEST METERS, METER PROVERS, PRESSURE REGISTERS AND INDICATORS, BAR AND JET PHOTOMETERS, WET AND DRY CENTER VALVES, and all Apparatus pertaining to Gas Works in their line.

Patentee and Sole Manufacturer of the ORIGINAL and ONLY CORRECT GAS EXHAUST GOVERNOR.

We hereby caution all parties against making, vending, or using any GAS EXHAUST GOVERNOR that will be an encroachment of our patent.

The support and confidence of Gas Companies, so long enjoyed by us, encourage us to pursue the same undeviating course that has contributed to establish the character of our house, and with our extended experience and increased facilities, develop the latest improvement that Science can apply, in the construction of Gas Meters, etc., and thereby merit a continuance of the favors hitherto so liberally extended to us, always guaranteeing satisfaction.

ANDREW HARRIS. JOHN J. GRIFFIN.

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MANUFACTURER OF

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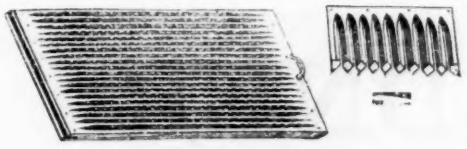

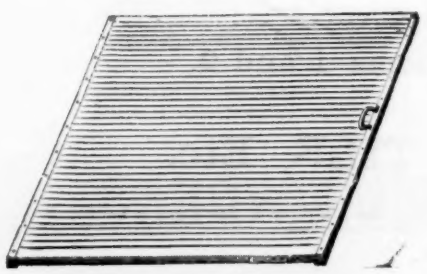

To Gas Companies.

The above Trays will last longer, and are cheaper than any Tray now used. They are now made without any outside strips, which gives more purifying surface, being perfectly smooth. The lime will not adhere to them as in other Trays. They are now used in over three hundred Gas Companies in he United States, and other places.

JOHN L. CHEESMAN,
151 and 153 Avenue C, New York.

R. D. WOOD & CO.,

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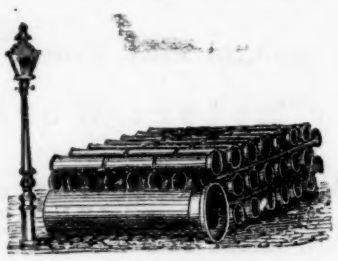
CAST IRON GAS & WATER PIPES, Matthews Patent Hydrants, Lamp Posts, Etc.



For the accommodation of parties who may want small lots Pipe for *immediate* delivery, we have established a yard in New York City.

We have on hand here several thousand feet of small Pipe, from which we can ship orders readily to any part of the country.

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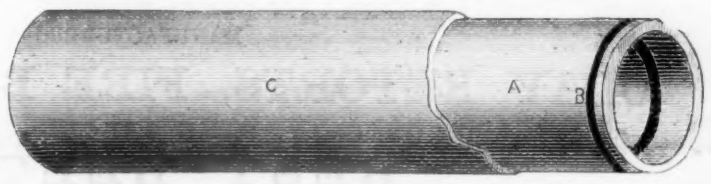
NORTHWESTERN
GAS AND WATER PIPE COMPANY.

WORKS, AT BAY CITY, MICHIGAN.

CHICAGO OFFICE, 646 WABASH AVENUE.

SECTION OF GAS PIPE.



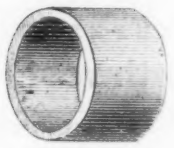


FIG. 2.

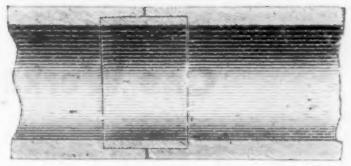


FIG. 3.

A—Cylinder of Wood. B—Band of Iron. C—Coating of Hydraulic or Asphaltum Cement.

FIG. 2.—Thimble for Connection. FIG. 3.—Horizontal Section and Connection.

Above is a cut of the

"WYCKOFF PATENT IMPERISHABLE GAS PIPE,"

manufactured by the NORTHWESTERN GAS AND WATER PIPE COMPANY.

This Pipe is made of White Pine, one inch to sixteen inches bore, in sections eight feet long rounded in a lathe, coated inside and out with Asphaltum, connected with a tenon, or socket, and a thimble joint, perfectly air and water tight, being driven together with cement furnished by the Company. When laid its cost is about one half that of Iron Pipe, and is UNQUESTIONABLY the best Gas conducting Main in use.

☞ Send for Descriptive Pamphlet and Price List. 242-1y

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PLYMOUTH IRON WORKS,

CONSHOCKEN, PA.,

Manufacturers of

PIG IRON & CAST IRON GAS & WATER PIPES.

Also, Heavy and Light Castings of every description.
412 Walnut street, Philadelphia, Pa.

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RILEY A. BRICK & CO.,

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ALSO,

GAS WORKS AND MACHINERY CASTINGS

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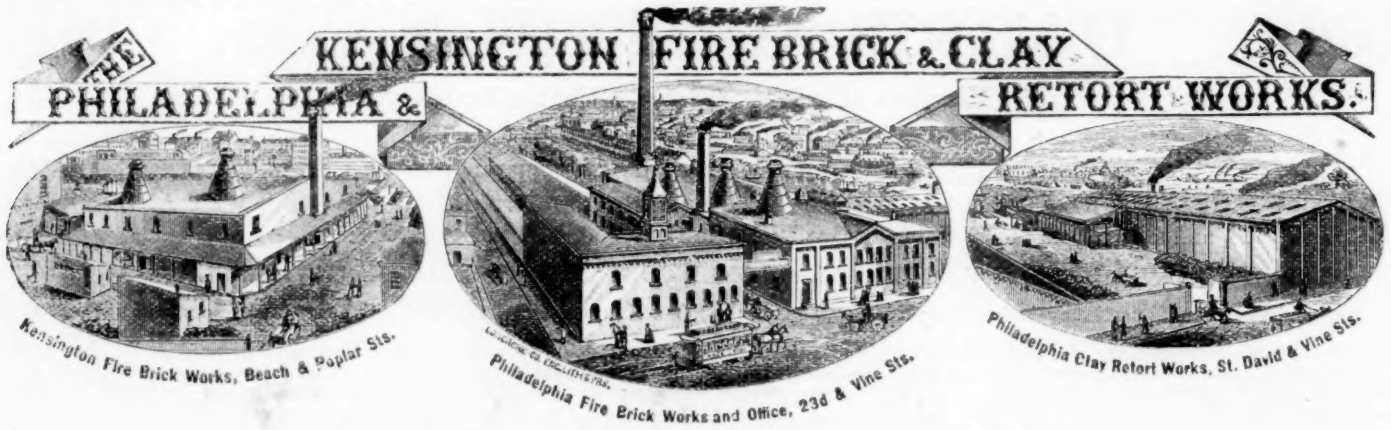
THE PHILADELPHIA &
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☞ Plans of Settings for Benches of Threes, Fives, and Sixes furnished, free of charge, upon application.

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MANUFACTURERS OF

CLAY RETORTS, FIRE BRICK, TILE, Etc.

FROM CLAY, SAME SPECIES, AND EQUAL TO

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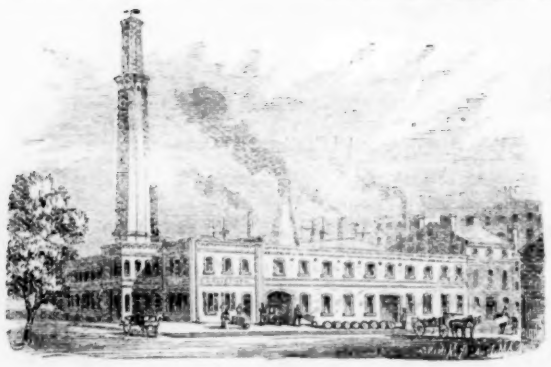

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☞ *Established in* 1845. ☜

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GAS RETORTS, TILES & FIRE BRICK
Of all shapes and sizes.

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Articles of every description made to order at the shortest notice.

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The yield of this Asphalt is nearly double, and the Candle Power more than double the product of Gas Coals, and it is extensively used by great and small companies, chiefly as an enricher and stimulant, in the proportion of five per cent. Yield 15,000 to 16,000 feet per gross ton. Illuminating power 30 to 32 candles. One bushel of lime purifies 6000 feet. Coke very strong. It is incapable of spontaneous combustion or caking in the heap, and is used by simple addition to the charge.

We sell at figures which allow a much larger profit to the purchaser, with better light than any standard coal.

No gas material is at once so safe and so cheap. Our Asphalt is used in the manufacture of Varnish, Roofing, Ship Paint, Tiles, Pavements, Water Proof Paper, Cloth, and for all purposes where a coating is required that is unaffected by Water, Gasses, Alkalies, or Acids.

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CONSUMERS GAS METERS, WET AND DRY,

Station Meters, Center Seals, Governors, Pressure Registers,

AND ALL KINDS OF PRESSURE GAUGES.

Experimental Meters and Standard Test Gasholders,

☞ And all apparatus in use at the Gas Works ☜

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NOW READY AND FOR SALE,

FODELL'S

System of Bookkeeping

FOR GAS COMPANIES.

Price $5, which should be sent either in Check, P. O. Order, or Registered Letter.

Blank Books, with printed headings and forms on this system, will be supplied to Gas Companies, by applying to W. P FODELL, Philadelphia, or

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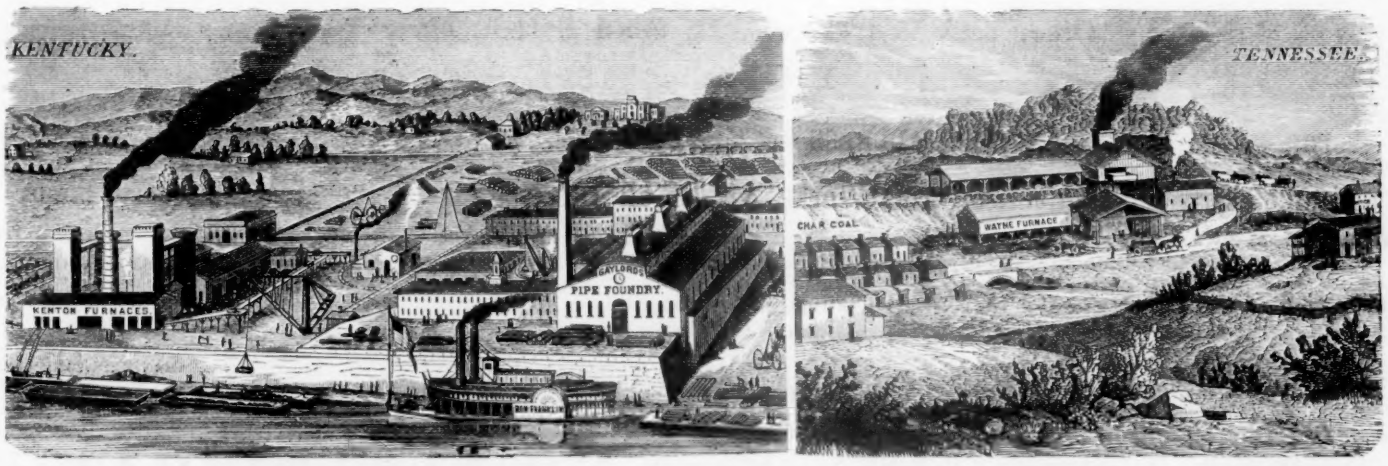

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And all forms of Special Castings for Gas and Water Works.

PIPE—2, 3, 4, 5, 6, 8, 10, 12, 14, 15, 16 to 60 inches: above 3 inches Cast in Dry Sand in 12 feet Lengths.

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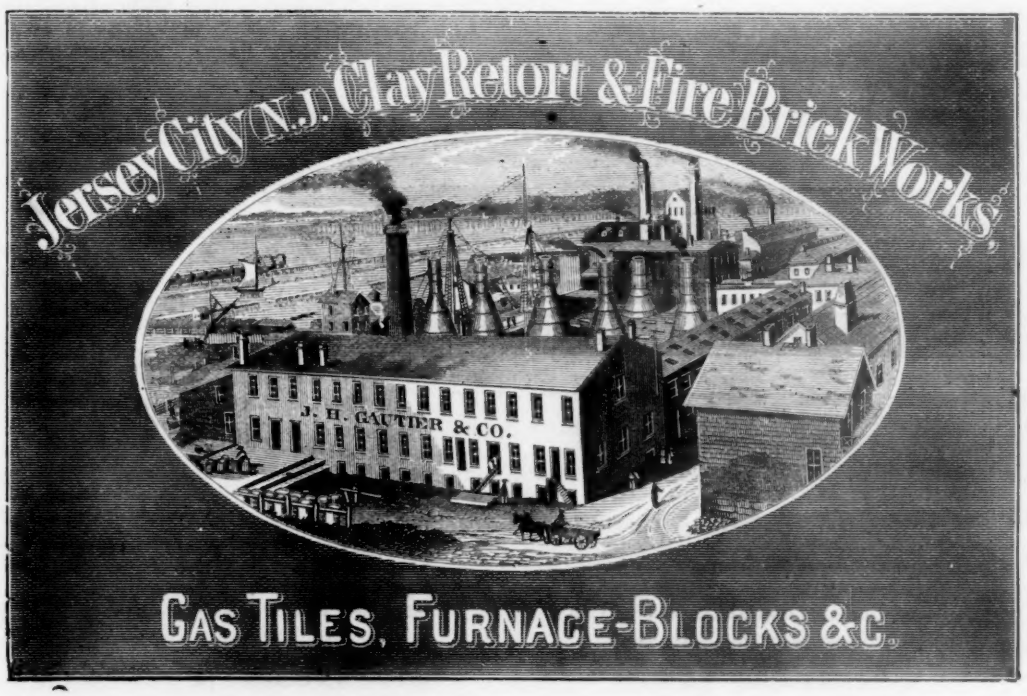
Our KENTON FURNACE gives us a fine quality of Stone Coal Iron; this with our Tennessee Charcoal Iron, which we retain for our Foundry use, enables us, by controlling our Iron. to turn out Castings of a uniform and superior quality, and at a cost advantageous to our Customers.

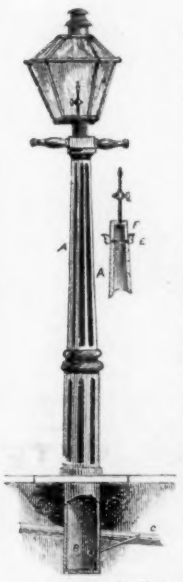
Exclusive Manufacturers of the **ROBBINS JOINT** for Street Mains. The Superintendent of the Indianapolis Gas Company (and many others) say of this Joint: "Its superiority consists of facility in laying, economy in time and lead, and above all, its perfection as a joint.

Estimates given for Furnishing and Laying Street Mains with either common or Robbins Joint.



GRAHAM'S

Patent Anti-Freezing LAMP POST.



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J. W. GRAHAM,

Dear Sir: Yours of the 14th inst at hand. In reply I would say that we have tested the six anti-freezing Lamp Posts purchased from you, and find them to be all as you represented. Whilst nearly a dozen of our sixty-five Posts were frozen down last month and first of this not one of yours was affected by the heavy frost. What can you sell them at?

Yours truly,
LUCAS FLATTERY
Sec'y Wooster Gas-Light Co.

Address the Patentee,

J. W. GRAHAM,
Chillicothe, Ohio.

250-9t

GEO. A. McILHENNY'S

PATENT

VACUUM PROCESS,

FOR RELIEVING GAS RETORTS FROM PRESSURE.

Patented in the United States and Great Britain, June 1867 first patent for this purpose in the United States (but not presented to the public until fully tested). Now in successfu operation for six years, with most satisfactory results.

The many devices lately brought to the notice of the American public, to accomplish the same results are mostly old English contrivances tried and abandoned years ago, on account of the machinery, stuffing boxes, valves, levers, etc., necessary

But the extraordinary results obtained by the McIlhenny process, have induced some unprincipled persons to bring to the notice of the public, as *recent inventions of their own*, some of these old devices; their purpose seems to be simply to evade the patent.

This process is not only safe, simple and effective, but costs little to apply. The only machinery necessary is a one and a half inch stop cock, and a half inch stop cock to each bench No alteration in the old system is required. In fact, a Works operated with this process, can at any time be operated on the old pressure system, simply by closing the two stop cocks above mentioned. There is nothing to get out of order, nothing that requires special attention; no stuffing-boxes to pack and keep tight, no valves to keep clear of tar and pitch, no levers to lubricate, and no expense for a great amount of machinery.

The McIlhenny process challenges the world as regards yield and quality of gas.

For particulars apply to GEO. A. McILHENNY, Engineer of the Washington Gas-Light Co., Washington, D. C., or to WILLIAM YORKE, Engineer of the Portland Gas-Light Co., Portland, Me., who will take pleasure in corresponding with any one interested.

307-1y

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MORRIS, TASKER & CO.,

PASCAL IRON WORKS, PHILADELPHIA.

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Established 1821.

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Manufacturers and Builders of Gas Works, &c., of all Descriptions, of the Most Approved Plans.

WROUGHT IRON ROOF FRAMES.—For Slate, or Corrugated Iron Coverings, with Cast Iron Cornice Gutter. Iron Doors and Frames, Wrought Iron Pivot Blinds, Windows and all kinds of Castings and Smith Work for Buildings.

BENCH CASTINGS.—Retorts, and all Castings and Wrought Iron Work required for Setting them on the Latest Plan. Tar Gates, Wrought Iron Stand Pipes, Retort Lids, Cotter Bars, Coal and Coke Wagons, and Stokers' Tools.

EXHAUSTERS.—Exhausters and Compensators, By-Passes to pass from 4,000 to 150,000 Cubic feet of Gas per hour, with Engines, Governors, Pressure and Vacuum Guages.

SCRUBBERS.—Single or Multitubular Scrubbers, with Self-Acting Pumps for Ammonia Water.

WASHERS.—Cataract and Single and Multitubular Spray Washers.

CONDENSERS.—Single and Multitubular Air and Water Condensers.

PURIFIERS.—For Purifying from 1,000 to 2,000,000 cubic feet capacity daily, with either wet or dry Lime, or Oxide of Iron, and with either Ash Rivetted or Wrought or Cast Iron Lime Sieves.

CARRIAGES.—Movable Lifting Carriages for Purifiers, arranged either for Floor or Overhead use.

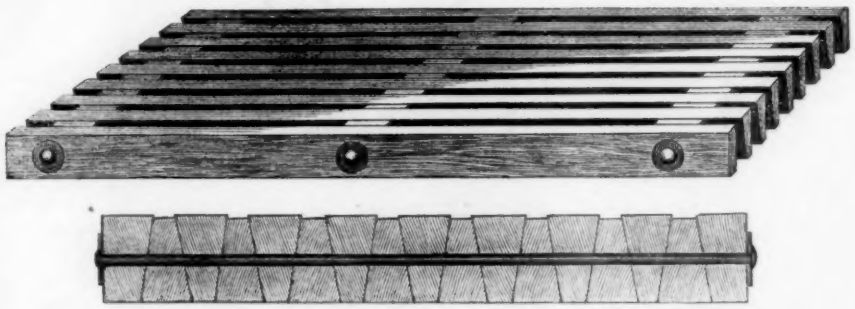
METERS.—Square and Round Meters of any capacity.

GAS HOLDERS.—Single Lift and Telescopic Gasholders, with Cast or Wrought Iron Suspension Frames.

GAS GOVERNORS.—Station Governors, with Regulating and Indicating Columns for Inlet and Outlet Pipes, also Dry Governors with Flexible Diaphragms for Underground Pipes.

STOP VALVES.—Double Faced Stop Valves for Gas or Water, from three inches to forty-eight inches diameter. These Valves are proved on both sides, with a heavy Water Pressure, Flange and Bell Pipes, Fittings and Drips of all descriptions. Steam Boilers and Hot Water Apparatus for Heating Building, and Gas Holder Tanks. Lamp Posts and Lanterns.

P. Munzinger's Patent Ash Lime Trays.



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Peoples Gas Company, Baltimore.
Lowell Gas-Light Company, Mass.
Lynn Gas-Light Company, Mass.
Albany Gas-Light Company, N. Y.
Schenectady Gas-Light Company, N. Y.
Utica Gas-Light Comwany, N. Y.
Jersey City Gas Company, N. J.
St. Paul Gas-Light Company, Minn.
Cumberland Gas-Light Company, Md.
Hartford City Gas-Light Company, Conn.
Richmond Gas Company, Va.
McKeesport Gas Company, Pa.
Middletown Gas Company, Pa.
East Newark Gas-Light Company, N. J.
Binghampton Gas Company, N. J.
Zanesville Gas Company, Ohio.
New Orleans Gas Company, La.
Salem Gas-Light Company, Mass.
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Rahway Gas-Light Company, N. J.
Trenton Gas-Light Company, N. J.
Elmira Gas Company, New York.
Erie Gas Company, Pa.
Columbus Gas-Light Company, Ohio,
Westchester Gas-Light Company, N. Y.
Santa Cruz Gas Company, Cal.
Lawrence Gas-Light Company, Kansas.
Salem Gas Company, N. J.
Indiana Gas-Light Company, Pa.
Peoria Gas Company, Ill.
Montclair Gas Company, N. J.
Williamsport Gas Company, Pa.
Wooster Gas-Light Company, Ohio.
Augusta Gas-Light Company, Ga.
Huntsville Gas Company, Ga.
Chattanooga Gas Company Tenn.
Murfreesboro Gas Company, Tenn.
Hagerstown Gas-Light Company, Md.
Hanover Gas Company, Pa.
Easton Gas Company, Pa.
Uniontown Gas-Light Company, Pa.
Coatesville Gas-Light Company, Pa.
Houston, Gas Company, Texas.
Wilkesbarre Gas Company, La.
Middletown Gas Company, New York.
Washington Gas-Light Company, Pa.
Princeton Gas-Light Company, N. J.
Newark Gas Company, Ohio.
Pontiac Gas-Light Company, Mich.
And numerous other Companies.